# U.S. Customs and Border Protection

**Integrated Fixed Towers (IFT)**
**Limited User Test (LUT)**
**Final Report**

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# Executive Summary

## Purpose

The Integrated Fixed Tower (IFT) Limited User Test (LUT) Independent Evaluation Report (IER) is presented by the CBP Operational Evaluation Branch (OEB); the DHS-designated "ground systems" Operational Test Authority (OTA). The purpose of the IFT LUT IER is to provide senior CBP decision-makers independent, scientifically validated information to support CBP leaders in reducing risk for the IFT acquisition program.

Independent Operational Test and Evaluation (OT&E) is conducted before each acquisition decision review to provide the decision authority unbiased information and analysis based upon latest results from testing the system's Critical Operational Issues (COIs). The Independent OT&E design ensures consideration of OEB's three internal functional OT&E metrics:

- **Adequacy.** The amount of data and realism of test conditions is sufficient to support robust evaluation of the COIs.
- **Quality.** The test planning, control of test events, and treatment of data provides for clear and accurate test reporting.
- **Credibility.** Ensure that external influence and personal biases are separated from the conduct of the test event and data handling.

The Limited User Test (LUT) is an Operational Test (OT) data collection event that is conducted to provide valid, analyzed, *operational* information supporting executive-level management decisions for acquisition programs. Independent Evaluation is the process of analyzing data from all sources (not just OT) using scientific methodology and appropriate statistical tools to prove or disprove a hypothesis. All OT&E is accomplished using incremental cycles of successive mission-based test and evaluation.

## Background

The April 2006 Secure Border Initiative (SBI) Mission Need Statement (MNS) documented capability gaps in United States Border Patrol's (USBP) ability to execute its border security mission. Addressing those gaps, the Arizona Border Surveillance Technology Plan identified a number of potential mature technologies availability for deployment while meeting local operational needs and constraints. Senior leadership selected an enhanced capability providing (b) (7)(E) Command, Control, Communication, Computers and Intelligence (C4I) functionality. Senior leadership also determined that the user's need could be best met by acquiring a non-developmental commercial sensor system providing the (b) (7)(E) (b) (7)(E) capability to improve Items of Interest (IoI) detection, tracking, identification, and classification within a given area of responsibility (AOR). Senior management established the

Integrated Fixed Tower (IFT) Program Management Office (IFT PMO) to manage the acquisition process.

**Scope**

OEB planned and conducted the LUT data collection using controlled condition sets performed in the context of scripted mission based operational scenarios, developmental test and operational test data collected during concurrent CBP live operations. The LUT also incorporated test vignettes and grouped IFT mission tasks to evaluate the performance during scripted and demonstration test events. OEB applies the continuous operational evaluation (COE) methodology to assess the IFT program. This methodology leverages not only the LUT event, but also a modeling and simulation exercise (Simulation Experiment [SIMEX]), the System Acceptance Test (SAT), deployment training and an operator functionality evaluation. Since the IFT system enhances the operator's senses and the IFT operator must interact with the system to make decisions and determine the appropriate actions to take, the operator is considered part of the system.

**OT&E Limitations**

The LUT is an operational test (OT) and by definition is limited and focused on evaluating first level user priorities or concerns. The LUT findings and recommendations are based on data collected during LUT execution on 26 October through 14 November 2015, as well as previously collected data as noted above.

- **Cybersecurity.** A full system cybersecurity evaluation was not conducted. OEB delayed a comprehensive examination until the system begins connecting to other systems and data sources and DHS Cyber Security OT&E requirements and policy are clarified. OEB did a limited examination of the stand-alone system. Office of Technology Innovation and Acquisition Information Security System Manager (ISSM) verified IFT to be in a stand-alone configuration in accordance with its Authority To Operate (ATO) (see appendix I for reference to the ISSM report).

- **Operational Effectiveness.** As part of the USBP's layered approach to border security, the system's contribution to the USBP mission accomplishment was not fully evaluated during the LUT. OEB leveraged results from a Simulated Experiment (SIMEX) exercise that provided insights into IFT's contribution in providing a (b) (7)(E) capability (see appendix I for reference to the SIMEX report).

- **Operational Suitablity.** Evaluation of the IFT's Reliability, Availability, Maintainability (RAM) and Logistics (RAML) was limited to the LUT execution period. Limited access to the Contractor Maintenance and Logistics Support (CMLS) data further hindered the ability to provide an accurate evaluation of maintenance and logistical support of the

system. Mean Logistics Delay Time is not reported because data was not available to evaluate the measure. The IFT CMLS contract gives the responsibility of recording maintenance data to the contractor. The Operational Test Team was not able to obtain this data.

**Critical Operational Issue (COI) Evaluation Results**

Operational effectiveness is defined as the IFT system's ability to support the user in accomplishing their specified operational mission and tasks. There are three possible outcomes:

- Operationally Effective – System fully supports the user's ability to accomplish their operational mission and tasks.
- Operationally Effective with Limitations – System supports the user's ability to accomplish their operational mission and tasks but limitations were observed.
- Not Operationally Effective – System did not support the user's ability to accomplish their mission and tasks.

Operational suitability is defined as the degree to which a system can be placed and sustained satisfactorily in field use with consideration given to availability, compatibility, transportability, interoperability, reliability, usage rates, maintainability, environment, safety, and occupational health risks, human factors, habitability, manpower, logistics, supportability, logistics supportability, natural environmental effects and impacts, documentation, and training requirements. There are three possible outcomes:

- Operationally Suitable – System can be placed and satisfactorily sustained in field use with no observed limitations.
- Operationally Suitable with Limitations – System can be placed and satisfactorily sustained in field use but with observed limitations that impact mission or task accomplishment relative to one or more of the suitability consideration attributes.
- Not Operationally Suitable – System cannot be placed in field use by the operator and/or cannot be sustained in field use by the operator.

Listed below are the COI evaluation findings. See section 3 for COI evaluation rationale.

**Effectiveness Findings**

**E-1: Will IFT support CBP border security between the POEs?**

- YES - The IFT system is operationally effective with noted limitations.
  - The IFT system is operationally effective for detecting IoIs at a range of (b) (7)(E) (b) (7)(E) in the (b) (7)(E) AOR.

- The IFT system is not operationally effective for identifying IoIs at a range of (b) (7)(E) in the (b) (7)(E) AOR.
- The IFT system is operationally effective for classification of (b) (7)(E) within the (b) (7)(E) AOR

**Suitability Findings**

**S-1 Will IFT reliability support mission accomplishment?**

- NO - The IFT system is not operationally suitable for reliability.
  - The Mean Time Between Critical Failure (MTBCF) (Not an ORD requirement) was measured during the LUT as (b) (7)(E)). This result is provided for USBP consideration and end-user operational planning and management purposes.
  - (b) (7)(E).

**S-2 Will IFT be maintainable?**

- YES - The IFT system is operationally suitable for maintainability.

**S-3 Will IFT availability support mission accomplishment?**

- YES - The IFT system is operationally suitable for availability.

**S-4 Will the IFT be logistically supportable?**

- YES - The IFT system is operationally suitable for logistics supportability.

**Other Operational Deficiencies and Operational Considerations**

A total of (b) (7)(E) operational deficiencies and (b) (7)(E) operational considerations are identified in the IFT LUT IER. Please refer to IFT LUT IER section 4 for details and recommendations.

**Revision History**

| Revision | Date | Description of Change |
|---|---|---|
| Rev A | 19 Feb 2016 | Original Release |
| Rev B | 18 Apr 2016 | Updated Exec Summary and Results Sections |

## TABLE OF CONTENTS

## List of Figures



## List of Tables

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# 1 INTRODUCTION

## 1.1 Background

The Department of Homeland Security (DHS) and U.S. Customs and Border Protection (CBP) chartered the Office of Technology Innovation and Acquisition (OTIA) to acquire the Integrated Fixed Tower (IFT) systems in support of CBP's long-range (b) (7)(E) needs. The IFT acquisition strategy is to acquire this operational capability from the commercial marketplace via full and open competition and to award a firm fixed price contract for the procurement of a number of operational IFT systems.

The IFT program is one of several programs resulting from the solutions engineering activity that culminated in the Arizona Technology Deployment Plan. It was determined that user needs, as specified in the IFT Mission Needs Statement (MNS), could best be met, in part, through the purchase and deployment of a number of fixed surveillance tower units (FSTU) equipped with various surveillance (b) (7)(E) and (b) (7)(E) to command and control centers (C2CEN). These surveillance systems provide the United States Border Patrol (USBP) with capability in (b) (7)(E) and Command, Control, Communication, Coordination and Intelligence (C4I) to fill critical gaps in:

- (b) (7)(E)

## 1.2 Purpose and Objectives

The purpose of the IFT LUT was to assess the Operational Effectiveness (OE) and Operational Suitability (OS) of the IFT when employed in live USBP operations per the IFT Test and Evaluation Master Plan (TEMP) and LUT Test Plan. This LUT gathered relevant operational data to validate the IFT's capability to provide (b) (7)(E) in support of the USBP mission. The IFT LUT was intended to provide refinement of initial tactics and system employment procedures. System performance was evaluated against defined and derived performance criteria identified in the IFT Integrated Evaluation Framework (IEF). The data collected during this LUT, combined with previously collected data qualified for Operational Test (OT), was used to evaluate Critical Operational Issues (COIs) defined in the IEF and the resulting IFT LUT Test Plan. The determination of performance shortfalls in specific environments, or against specific category of threats, was provided for consideration of system employment in future USBP operations and contribute to the incremental improvement of future IFT design.

The Test Objectives (TO) of this event, as documented in the IFT TEMP, were as follows:

- Validate that the procured IFT system functions as an integral part of USBP's layered approach to border security
- Validate the Operational Capabilities of Interest (OCI) in the awarded IFT contract. OCIs directly trace to the IFT Operational Requirement Document (ORD)

- Evaluate the operational impact of the operational requirements not included in the awarded contract
- Evaluate the Reliability, Availability, Maintainability and Logistics (RAML) capability to support the continuous (b) (7)(E) mission

With respect to these objectives, the operational impact of the requirements not included in award contract was not evaluated during the LUT. However, during the week of 18-22 July 2016, the National Security Experimentation Laboratory (NSEL) at MITRE, McLean, VA will conduct an Integrated Fixed Towers (IFT) Simulation Experiment (SIMEX). This Simulation Experiment (SIMEX 16-2) will explore select IFT operational requirements that are currently not implemented.

## 1.3 COIs

The COIs developed for the IFT LUT were designed to accomplish the test objectives outlined in the IFT TEMP.

The LUT evaluated the following Effectiveness COI:

- E-1 Will IFT support CBP border security mission between Ports of Entry (POE)?

The LUT evaluated the following Suitability COIs:

- S-1 Will IFT reliability support mission accomplishment?
- S-2 Will the IFT be maintainable?
- S-3 Will IFT availability support mission accomplishment?
- S-4 Will the IFT be logistically supportable?

## 1.4 System Description

The IFT system is designed to provide a (b) (7)(E) capability to enable Agents located within a station's command and control center (C2CEN) to effectively and efficiently conduct the critical border security mission tasks of detecting, tracking, identifying, and classifying Items of Interest (IoIs) in rural and remote areas. It also supports CBP in helping predict, deter, detect, track, identify/classify, respond, and resolve border security incursions. The IFT system uses (b) (7)(E)

(b) (7)(E) Since the IFT system enhances the operator's senses and the IFT operator must interact with the system to make decisions and determine the appropriate actions to take, the operator is considered part of the system.

### 1.4.1 FSTUs

The IFT system uses a series of FSTUs for IoI detection, tracking, identification, and classification. Each FSTU is (b) (7)(E)

(b) (7)(E)

Each FSTU is equipped with (b) (7)(E)

(b) (7)(E)

Each FSTU is equipped with a (b) (7)(E)

**Power System**

Each FSTU uses (b) (7)(E)

(b) (7)(E)

Wideband communication to and from the tower uses (b) (7)(E)

(b) (7)(E)

A perimeter protection suite that includes an intrusion detection/alarm system, integrated Pan-(b) (7)(E)

### 1.4.2 C2CEN

The C2CEN is located at the (b) (7)(E) Border Patrol Station (BPS). It includes workstations, displays, servers, storage, network switches, and Information Technology (IT) management systems to control and monitor the system's health.

**Operator Workstation (OWS)/Console with COP**

IFT workstations feature (b) (7)(E) . Operators use (b) (7)(E) . The OWS also provides video storage and retrieval capabilities.

**Software Configuration**

Table 1 details the LUT software configuration suite for the IFT's major components.

**Table 1: IFT Software Configuration**

| Subcomponent | Software Configuration |
|---|---|
| C2CEN | (b) (7)(E) |
| Human/Machine Interface | |
| COP/C2 Border Control Application | |
| (b) (7)(E) | |
| Correlation Engine | |
| Training Simulation | |
| Digital Video Recorder | |

### 1.4.3 Systems Interface Description

The IFT system (displayed in figure 1) consists of a COP located in the C2CEN that integrates and displays data from all IFT units deployed within the USBP Station's AoR, and supporting power and communications. Each IFT unit consists of (b) (7)(E)

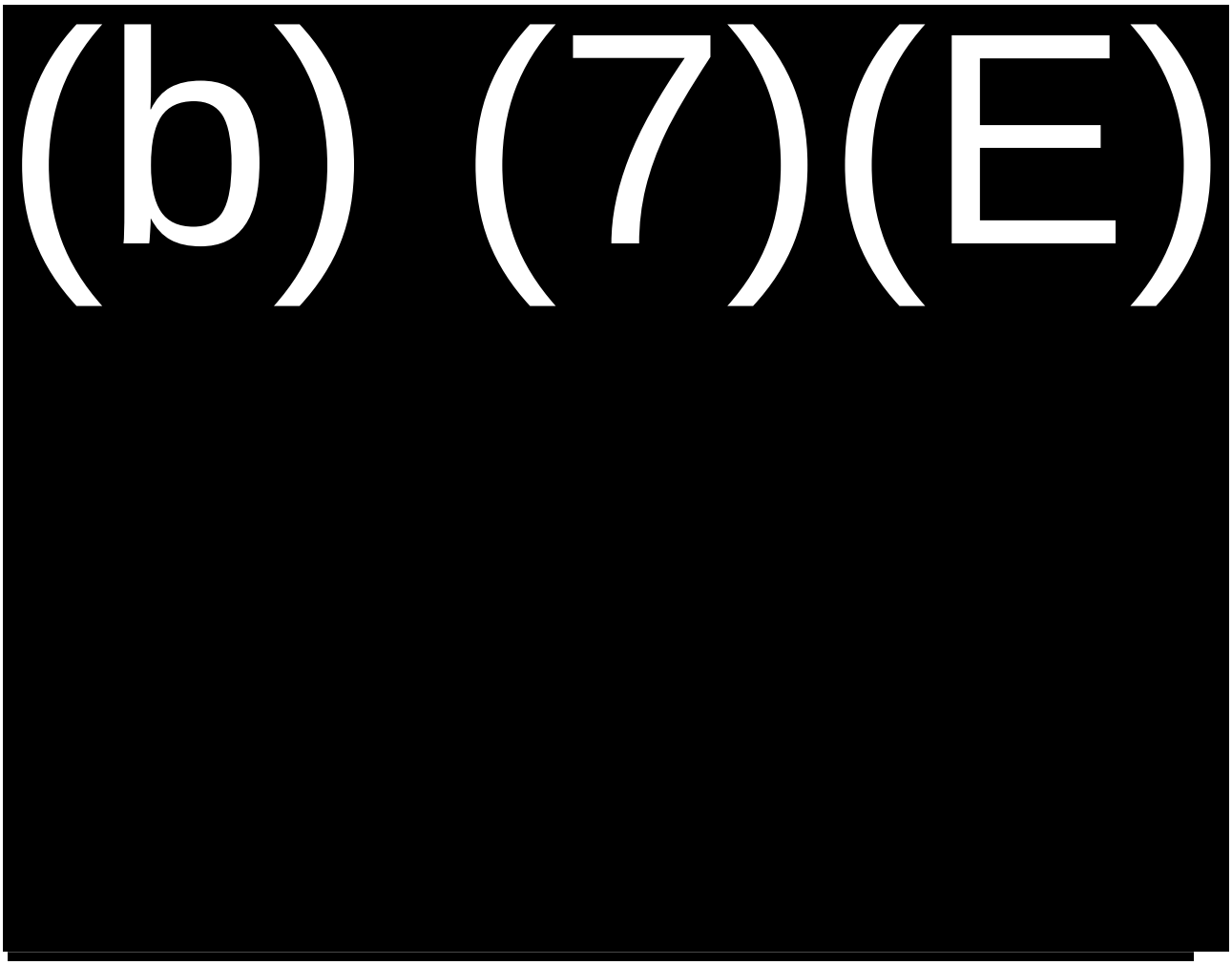



**Figure 1: IFT System Overview**

# 2 OVERALL APPROACH

## 2.1 Event Documentation

Event documentation consisted of test planning documents (Test Plan, and Test Readiness Review Briefings), test execution documents and test reporting documents (Daily Status Reports, Quick Look Briefings, and Final Report). These documents are summarized as follows:

**Test Planning Documents**

- **Operational Evaluation Branch (OEB) Test Plan**, *OTIA05-IFT-71-150016.* This document provided the details of how the OEB / Independent Test Organization (ITO) test team planned to execute the LUT, record data and observations, analyze the data and execute the schedule of events.
- **Operational Test Readiness Review Briefings**. These briefings presented the readiness status of DT, the SUT, Test Documentation, Resources, and Contractor, Government and USBP personnel to Stakeholders to gain their concurrence and approval to proceed to commencement of independent OT.

**Test Reporting Documents**

- **Daily Status Reports**. These documents summarized the LUT daily activities, runs executed, Operational Test Observation Reports (TOR) generated, and plans for the next day of testing.
- **LUT Final Report,** *OTIA05-IFT-77-160004*. This document provides the detailed results of the test to include: COI Evaluation and Rationale, Major Quantitative and Qualitative Results, SUT/SoS Deficiencies, Operational Considerations, RAM Data, User Feedback, and Effectiveness and Suitability Findings and Recommendations.

## 2.2 Event Schedule

Table 2 is the LUT Event Schedule. The Detailed Execution Schedule is located in appendix C.

**Table 2: LUT Event Schedule**

| Activity | Start Date | End Date |
|---|---|---|
| Test Readiness Review | 10/23/2015 | 10/23/2015 |
| Pre-test Activities | 10/24/2015 | 10/25/2015 |
| Runs for Record | 10/26/2015 | 11/14/2015 |
| Data Verification and Validation | 11/15/2015 | 11/22/2015 |
| Final Report | 11/23/2015 | 02/19/2016 |

## 2.3 Event Location

This event was conducted at the (b) (7)(E) Station C2CEN and pre-designated locations within the (b) (7)(E) AoR where planned IoIs were positioned.

## 2.4 Event Design Overview

The LUT was conducted concurrently with live CBP operations, and incorporated CBP operational data as well as test data collected in controlled condition sets performed in the context of a scripted based operational scenario. Test vignettes grouped CBP and IFT mission tasks, permitting the evaluation of SUT performance in scripted and demonstration test events. Additional observational, examination, and administrative events were conducted in the continuous operational evaluation.

## 2.5 Event Conditions

The LUT as conducted from 26 October through 14 November 2015. Each test day was approximately eight hours in duration. In order to understand operational effectiveness and suitability in varying operational environment conditions (i.e., night versus day) and the full spectrum of USBP operations, each test day was offset by four hours. The test consisted of executing multiple vignettes based on the design of experiments and the test plan schedule of events. Typical, trained USBP IFT users were used while performing their routine (b) (7)(E) Station mission and tasks. Operational environment conditions were typical for the (b) (7)(E) AZ fall season (i.e., (b) (7)(E) ). During the test, there were (b) (7)(E) Lastly, real world Law Enforcement Officer (LEO) events/operations occurred simultaneously with the test trial/runs providing additional data and insights.

## 2.6 LUT Team Organization

Test team roles were executed per the LUT Plan. Table 3 lists the personnel that supported execution of the LUT. OEB was the Operational Test Authority (OTA). The United States Navy, Commander, Operational Test and Evaluation Force (COTF) was the Independent Test Organization (ITO), comprised of Government employees and CGI Contract Support.

The test was supported by (b) (7)(E) USBP agents, (b) (7)(E) , (b) (7)(E) .

**Table 3: LUT Team Organization**

| Position | Personnel | Organization |
|---|---|---|
| Operational Test Director (OTA) | Supervisory Border Patrol Agent (b)(6);(b)(7)(C) | OTIA/OEB |
| Operational Test Manager | (b)(6);(b)(7)(C) | OTIA/OEB |
| Operational Test Director (ITO) | LT (b)(6);(b)(7)(C), USN | COTF/ITO |
| Data Collector / Data Analyst | (b)(6);(b)(7)(C) | COTF/ITO |
| Data Collector / Data Analyst | (b)(6);(b)(7)(C) | Contract Support/CGI |

| Position | Personnel | Organization |
|---|---|---|
| Test Execution Analyst / Data Collector/Logistics/Communication Coordinator | (b)(6);(b)(7)(C) | Contract Support/CGI |
| Data Collector | (b)(6);(b)(7)(C) | Contract Support/CGI |
| Data Analyst | (b)(6);(b)(7)(C) | Contract Support/CGI |

## 2.7 User Feedback

The purpose of this data collection was to gather feedback from the IFT operators about IFT's ability to support their mission and tasks. The test team, assisted by the Human Factors Engineer, used Common Operating Response Environment (CORE) Pacific Northwest National Laboratory (PNNL) software and tablets to collect user feedback. This activity occurred throughout the 15-day LUT event from 26 October - 14 November 2015.

## 2.8 Simulation Experiment (SIMEX)

The USBP has a requirement to understand the operational effectiveness and the operational suitability of the IFT system and its overall contribution to the agency's multilayered approach to accomplishing border security. The LUT was conducted as the major part of the IFT Operational Test and Evaluation (OT&E) activities. One of the objectives of the LUT (Objective 1) is to "Validate that the procured IFT system functions as an integral part of USBP's layered approach to border security." This objective, as stated in the IFT TEMP, includes evaluating the following:

- IFT contribution to the multilayered coverage of the AoR
- IFT impact on resource utilization efficiency
- IFT impact on IoI resolution (e.g., detections, tracking, identification, elapsed time to resolve)

The SIMEX was conducted 26-30 January 2015 at the NSEL in McLean, VA. USBP agents from the (b) (7)(E) Border Patrol Station (BPS) participated in the event. The agents monitored the IFT system, Remote Video Surveillance System Upgrade (RVSS-U), UGS, and the Mobile Surveillance Capability (MSC) against simulated incursions of IoIs. Other USBP agents also participated remotely from the Tucson, AZ sector. These acted as field agents during the interdiction and apprehension of the IoIs.

Based on the results observed during the IFT SIMEX, it is evident that the planned IFT system will play an integral role in the layered approach to border security. The large area covered by (b) (7)(E)

locations. Feedback from the agents during the SIMEX on the IFT system was positive (see appendix I for reference to the SIMEX report).

# 3 RESULTS

All operational effectiveness and suitability results were accomplished using the procedures and data analysis described in the LUT Test Plan. For deviations, see appendix B.

## 3.1 Major Quantitative and Qualitative Test Results

Table 4 contains the operational context for the IFT system capability evaluation. These determinations consider all of the following factors:

- The ability of the system to support the user's ability to accomplish their operational mission and tasks,
- The ability of the IFT system to provide a (b) (7)(E)
- The user's ability to effectively and efficiently use and maintain the IFT system based on training provided;
- The sufficiency of the tactics, techniques and procedures exercised by the user; and
- The task saturation of the IFT system operator when attempting to accomplish their operational mission and tasks.

Table 4 provides the definitions for the criteria used to state the findings of an operational measure. All measures and test results are in appendix D.

**Table 4: System Capability Evaluation Definitions**

| System Capability Evaluation Definitions | |
|---|---|
| Met | User able to accomplish the mission with the capability provided by the system |
| Met with Exception | User able to accomplish the mission with limited or no capability provided by the system |
| Not Met | User not able to accomplish the mission with the capability provided by the system |

## 3.2 Usability Analysis Approach and Methodology

A usability analysis approach was implemented in order to evaluate the "ease of use" elements of the IFT system as part of the LUT. The goal of this approach was to collect and analyze user feedback within the context of nine critical operational areas. In addition, agents completed a System Usability Scale (SUS) questionnaire that measured perceptions of usability.

Trained USBP agents participated in the 15-day LUT event. (b) (7)(E) agents operated the system per shift (b) (7)(E) per day. Throughout the LUT, agents provided feedback using surveys stored on touch-screen tablets using the PNNL CORE system. Both

quantitative (rating scales) and qualitative (short fill-in) responses were collected. The 5-point Likert rating scale, one of the most common scaling methods for usability testing, was used to indicate "level of agreement" for usability statements as well as (b) (7)(E) (b) (7)(E). In general, a rating response of 1 or 2 indicated a negative response, and a rating response of 4 or 5 indicated a positive response. A rating of 3 was considered a limit or "red line" value, indicating an area that may require closer investigation. Means for each of the ratings were calculated, and responses to short fill-in questions was summarized, collated, and analyzed for patterns. In addition, agents provided feedback during end-of-day hot washes and individual end-of-test interviews.

**Table 5: Usability Analysis Results for Identification Range and Video Quality**

| Measure | Description | (b) (7)(E) | Distances | Results |
|---|---|---|---|---|
| (b) (7)(E) | (b) (7)(E) | (b) (7)(E) | | |
| (b) (7)(E) | (b) (7)(E) | | | |

| Measure | Description | (b) (7)(E) | Distances | Results |
|---|---|---|---|---|
| | | | (b) (7)(E) | |

## 3.3 Participants

A total of (b) (7)(E) CBP agents operated the system and comprised the sample size for the survey. Although agent experience varied across the (b) (7)(E) agents, each participant was experienced in field operations at the (b) (7)(E) Station, with an average of (b) (7)(E) experience. Most of the agents possessed significant experience in related systems such as Remote Video Surveillance System (RVSS), Mobile Surveillance System (MSS), and Mobile Surveillance Capability (MSC). All agents had completed IFT Familiarization Training, Deployment Classroom Training, and/or Deployment Hands-on Training. Agents participated (b) (7)(E) The number of survey subjects, as well as their background and experience, provide a representative sample of users of sufficient sample size for the OE event.

## 3.4 Previous COI Assessment

OEB employed a continuous operational evaluation approach, and provided one Letter of Observation following the SAT. OEB leveraged data collected during the following events:

- SIMEX, 26 – 30 January 2015
- System Acceptance Test (SAT) in (b) (7)(E) AOR, June 22 – 25, 2015
- Deployment training, 29 June – 2 July 2015
- Operator Evaluation, 17 August – 30 August 2015

## 3.5 LUT COI Evaluation

### COI E-1, Border Security

Will IFT support CBP border security mission between the POEs?

### Results (Evaluated MET with exception)

The IFT was evaluated for its ability to provide a (b) (7)(E) capability to the Agents at the (b) (7)(E) station when conducting the border security critical mission tasks of: Detect, Identify and Classify IoIs. Operational environment conditions included day and night light conditions, remote environments, single IoIs, IoI groups, and conveyances. (b) (7)(E) The following paragraphs give the major results for these three mission tasks.

### Detect (Evaluated MET)

The IFT met all critical measure thresholds during the LUT. Outer radial detection range threshold (b) (7)(E) was met, with a maximum detection range observed (b) (7)(E). (b) (7)(E)

(b) (7)(E)

. Table 5 shows the results from the critical measures for the detect mission task.

**Table 6: Major Quantitative and Qualitative Test Results - Detect**

| Major Quantitative and Qualitative Test Results | | | | | |
|---|---|---|---|---|---|
| **Task Title** | **Measure** | **Critical Measure** | **Threshold** | **Results** | **Data** |
| Detect | (b) (7)(E) | (b) (7)(E) | | | |
| Note:<br>A (*) Denotes average | | | | | |

| Major Quantitative and Qualitative Test Results | | | | | |
|---|---|---|---|---|---|
| **Task Title** | **Measure** | **Critical Measure** | **Threshold** | **Results** | **Data** |
| **Bold** indicates a measure/result was evaluated NOT MET | | | | | |

**Identify (Evaluated NOT MET)**

The identify task was evaluated as part of the overall (b) (7)(E) capability supporting the detect, identify, and classify sequence of border security tasks. For the LUT, given that the IFT radar detected an operational test run/trial, a successful IFT system identification depended on an operator-initiated investigation of the IFT radar detection. The IFT system identification was scored as successful when the operator, aided by (b) (7)(E) cameras made the determination that the detected IoI was (b) (7)(E) (IFT (b) (7)(E) (b) (7)(E) For all runs, successful IFT system identification occurred for (b) (7)(E) of the IFT(b) (7)(E) runs/trials. (b) (7)(E) . Table 6 shows the results for the critical measures for the identify task.

**Table 7: Major Quantitative and Qualitative Test Results - Identify**

| Major Quantitative and Qualitative Test Results | | | | | |
|---|---|---|---|---|---|
| **Task Title** | **Measure** | **Critical Measure** | **Threshold** | **Results** | **Data** |
| Identify | (b) (7)(E) | Probability of identification. All Test Runs. | (b) (7)(E) | | |
| | | Probability of identification. (b) (7)(E) | | | |
| | | Maximum identification time for an IFT operator to correctly identify (b) (7)(E) under typical operating conditions from IFT system video. | | | |
| Note:<br>A (*) Denotes average | | | | | |

| Major Quantitative and Qualitative Test Results | | | | | |
|---|---|---|---|---|---|
| **Task Title** | **Measure** | **Critical Measure** | **Threshold** | **Results** | **Data** |
| **Bold** indicates a measure/result was evaluated NOT MET | | | | | |

**Classify (Evaluated MET with Exception)**

The IFT camera allowed the user to classify (b) (7)(E) Table 7 shows the results for the critical measures for the classify task.

**Table 8: Major Quantitative and Qualitative Test Results -Classify**

| Major Quantitative and Qualitative Test Results | | | | | |
|---|---|---|---|---|---|
| **Task Title** | **Measure** | **Critical Measure** | **Threshold** | **Results** | **Data** |
| Classify | (b) (7)(E) | (b) (7)(E) | | | |

| Major Quantitative and Qualitative Test Results | | | | | |
|---|---|---|---|---|---|
| **Task Title** | **Measure** | **Critical Measure** | **Threshold** | **Results** | **Data** |
| Note:<br>A (*) Denotes average<br>**Bold** indicates a measure/result was evaluated NOT MET | | | | | |

Appendix E contains a more detailed discussion and graphical depiction of the User Feedback responses about IFT operational effectiveness and suitability.

OPCON #1 in Section 4, Recommendations, provides a more detailed discussion of CONOPS and TTP gaps observed.

**Effectiveness Deficiencies**

Border Security effectiveness deficiencies identified during LUT are summarized in Table 6. Individual deficiency descriptions follow in the order listed. A deficiency summary table is provided in section 4, Table 7. Baseline deficiency definitions are described in Table 7, and the evaluation process flow is depicted in Figure B-1 of Appendix B.

**Table 9: COI E-1, Border Security Deficiency Summary**

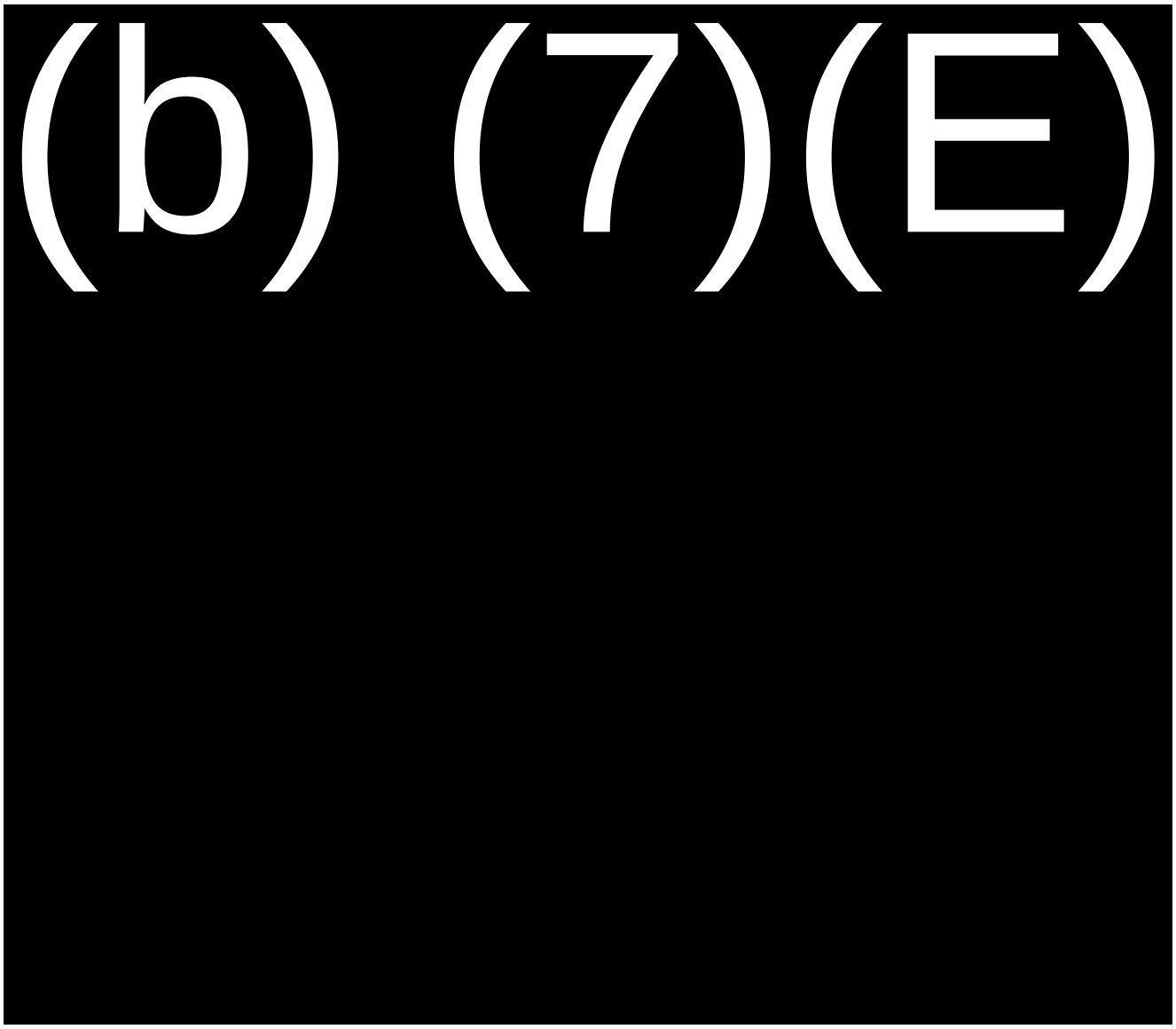
| COI E-1, Border Security Deficiency Summary | | | | |
|---|---|---|---|---|
| **No.** | **Title** | **Mission Area** | **COI** | **Level** |
| 1 | (b) (7)(E) | | | |
| 2 | | | | |

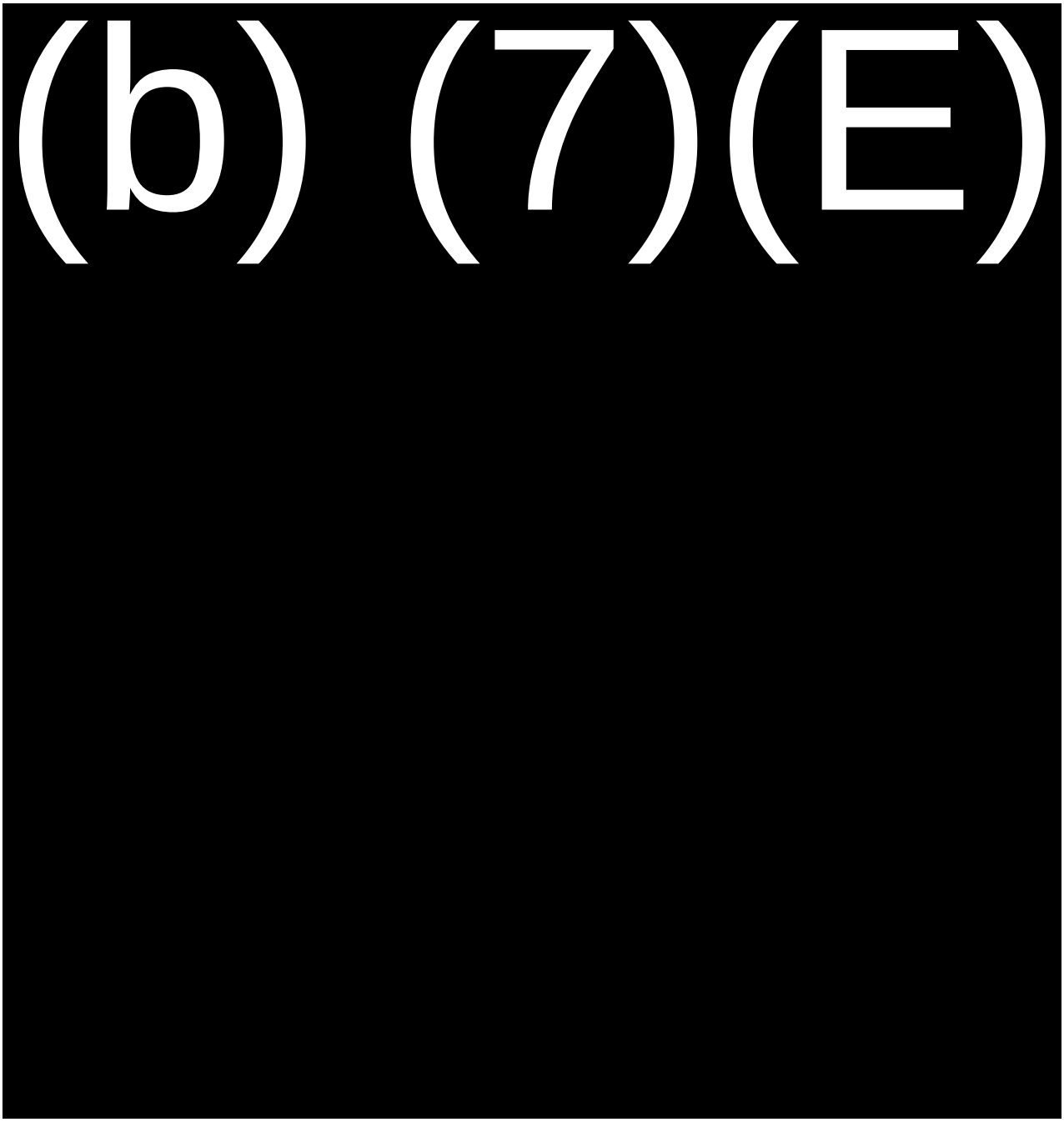
| COI E-1, Border Security Deficiency Summary | | | | |
|---|---|---|---|---|
| **No.** | **Title** | **Mission Area** | **COI** | **Level** |
| 3 | (b) (7)(E) | | | |
| 4 | | | | |
| 5 | | | | |

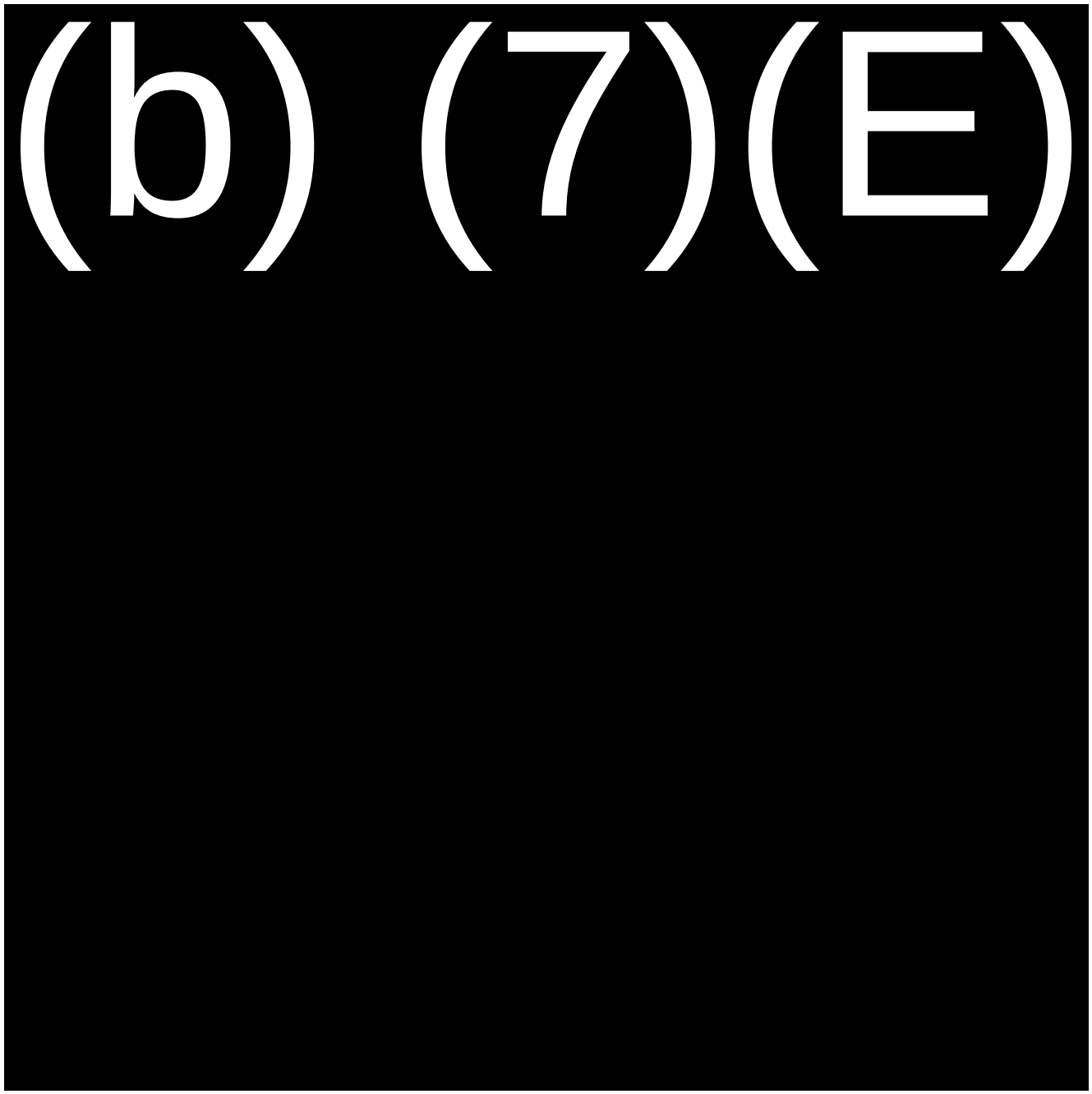
Table 7 contains the SUT and SoS baseline deficiency definitions used throughout the evaluation process.

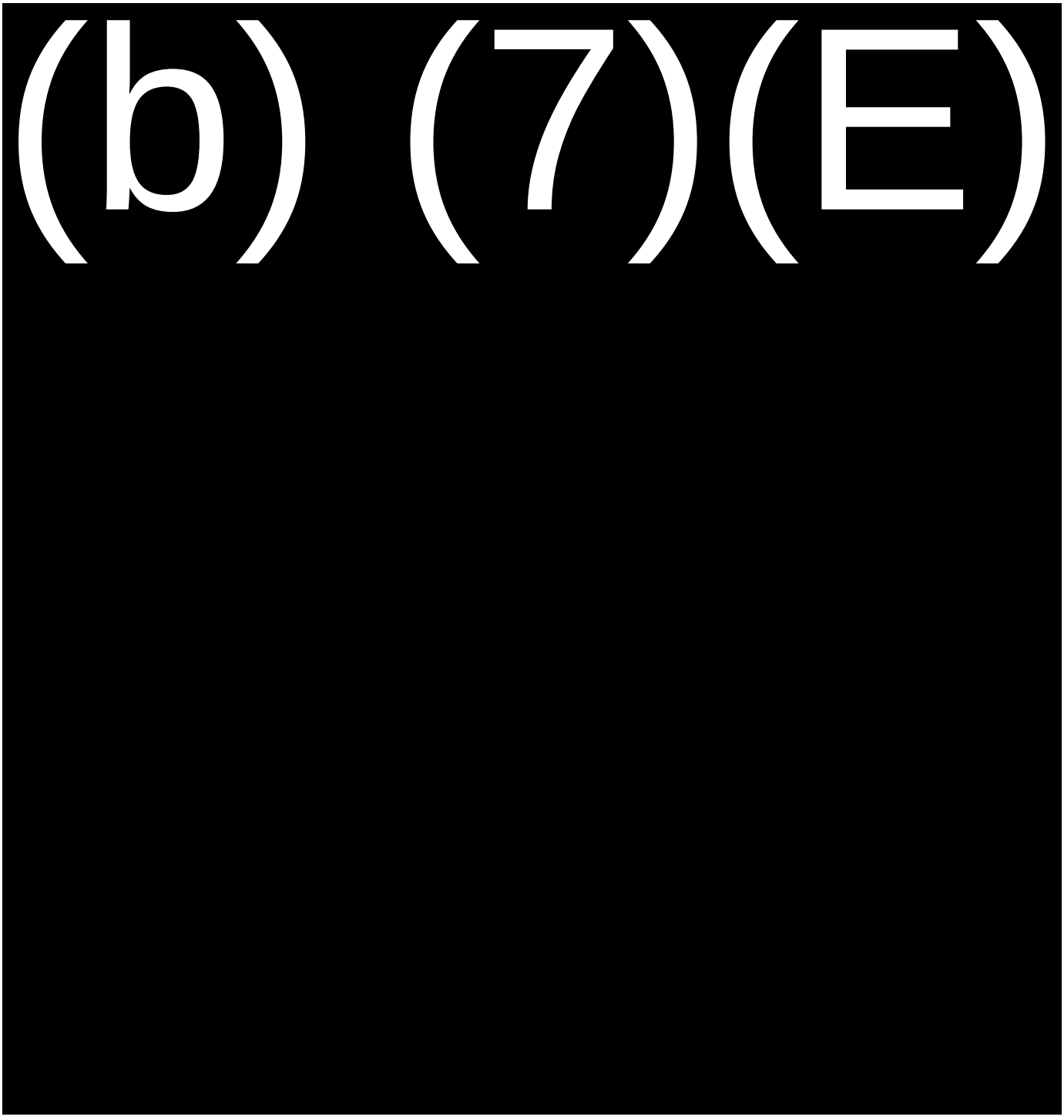
**Table 10: Baseline Deficiency Definitions**

| Baseline Deficiency Definitions | |
|---|---|
| Severe | Precludes mission accomplishment |
| Major 1 | Critical impact on mission accomplishment |
| Major 2 | Serious impact on mission accomplishment |
| Major 3 | Moderate impact on mission accomplishment |
| Minor | No significant impact on mission accomplishment |

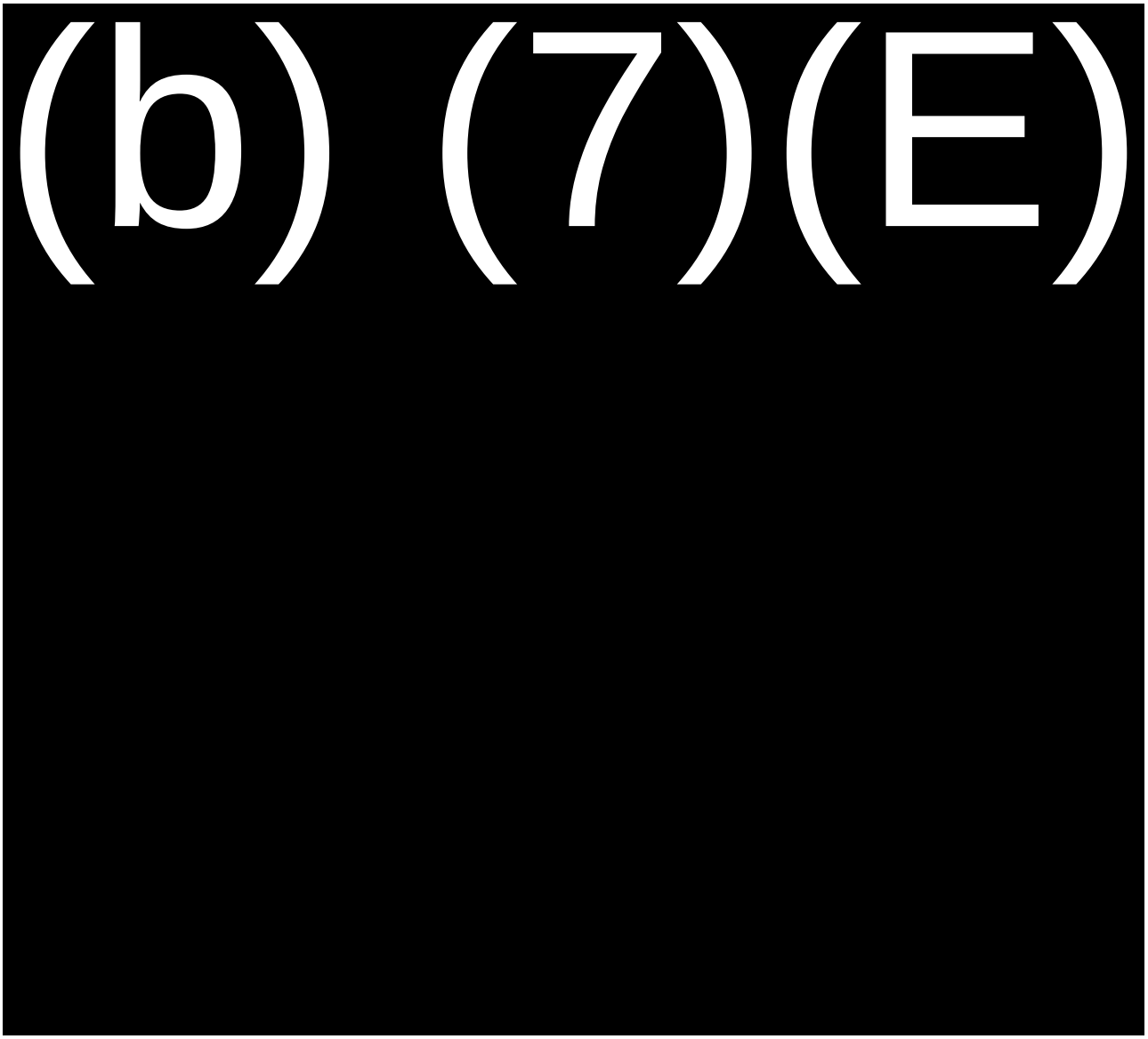

(b) (7)(E)


(b) (7)(E)


(b) (7)(E)


(b) (7)(E)

.




**COI S-1, Reliability**

Does IFT reliability support mission accomplishment?

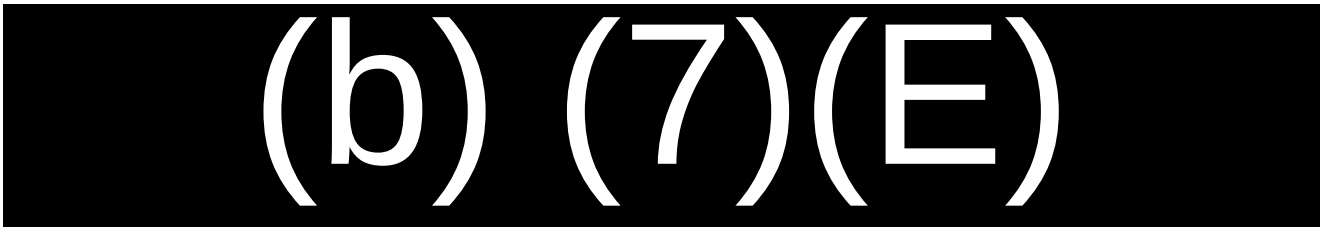


**Table 11: Major Quantitative and Qualitative Test Results**

| Major Quantitative and Qualitative Test Results | | | | | |
|---|---|---|---|---|---|
| **Task Title** | **Measure** | **Critical Measure** | **Threshold** | **Results** | **Data** |
| Reliability | (b) (7)(E) | (b) (7)(E) | | | |
| Note:<br>**Bold** indicates a measure/result was evaluated UNSAT | | | | | |

(b) (7)(E)

The reliability of the IFT system to support completion of its mission was evaluated during LUT from October 26 - November14, 2015 at the (b) (7)(E) AZ Border Patrol Station. Quantitative data were provided under IFT Contractor Maintenance Logistics Support, as documented in the contractor technical logs, and from Test Observation Reports.

(b) (7)(E)

**COI S-2, Maintainability**

Is the IFT maintainable?

(b) (7)(E)

(b) (7)(E)

**Table 12: Major Quantitative and Qualitative Test Results**

| Major Quantitative and Qualitative Test Results | | | | | |
|---|---|---|---|---|---|
| **Task Title** | **Measure** | **Critical Measure** | **Threshold** | **Results** | **Data** |
| Maintainability | (b) (7)(E) | (b) (7)(E) | | | |

**COI S-3, Availability**

Does IFT availability support mission accomplishment?

(b) (7)(E)

**Table 13: Major Quantitative and Qualitative Test Results**

| Major Quantitative and Qualitative Test Results | | | | | |
|---|---|---|---|---|---|
| **Task Title** | **Measure** | **Critical Measure** | **Threshold** | **Results** | **Data** |
| Availability | (b) (7)(E) | (b) (7)(E) | | | |

| Major Quantitative and Qualitative Test Results | | | | | |
|---|---|---|---|---|---|
| Task Title | Measure | Critical Measure | Threshold | Results | Data |
| | | (b) (7)(E) | | | |

(b) (7)(E)

**COI S-4, Logistic Supportability**

Is IFT Logistically supportable?

(b) (7)(E)

**Table 14: Major Quantitative and Qualitative Test Results**

| Major Quantitative and Qualitative Test Results | | | | | |
|---|---|---|---|---|---|
| Task Title | Measure | Critical Measure | Threshold | Results | Data |
| Logistic Supportability | M196 | (b) (7)(E) | | | |

# 4 RECOMMENDATIONS

## 4.1 LUT Deficiency Summary

(b) (7)(E)

**Table 15: IFT LUT Deficiency Summary**

| IFT LUT Deficiency Summary | | | | |
|---|---|---|---|---|
| **No.** | **Title** | **COI** | **Level** | **Recommendation** |
| (b) (7)(E) | | | | |

## 4.2 Operational Considerations (OPCONs)

OPCONs document considerations that inform operational users of significant aspects (pro and con) of system employment, or make clear to them what special measures would be required to make the system more efficient in operational use. Eleven effectiveness OPCONS were identified during LUT and are summarized in Table 9. Recommendations follow below.

**Table 16: IFT LUT Operational Considerations Summary**

| IFT LUT Operational Considerations Summary | | | |
|---|---|---|---|
| **No.** | **Related COI** | **Topic** | **Related Mission Area** |
| 1 | E-1 | (b) (5), (b) (7)(E) | |
| 2 | E-1 | | |
| 3 | E-1 | | |
| 4 | E-1 | | |
| 5 | E-1 | | |
| 6 | E-1 | | |
| 7 | E-1 | | |
| 8 | E-1 | | |
| 9 | E-1 | | |
| 10 | E-1 | | |
| 11 | E-1 | | |
| Note: (b) (7)(E) | | | |

**OPCON Recommendations**

Implement the following eleven OPCONs to enhance IFT system operations and C2CEN overall situational awareness.

**OPCON #1**

(b) (5), (b) (7)(E)

**OPCON #2**

(b) (5), (b) (7)(E)

**OPCON #3**

(b) (5), (b) (7)(E)

**OPCON #4**

(b) (5), (b) (7)(E)

**OPCON #5**

(b) (5), (b) (7)(E)

**OPCON #6**

(b) (5), (b) (7)(E)

**OPCON #7**

(b) (5), (b) (7)(E)

**OPCON #8**

(b) (5), (b) (7)(E)

**OPCON #9**

(b) (5), (b) (7)(E)

**OPCON #10**

(b) (5), (b) (7)(E)

**OPCON #11**

(b) (5), (b) (7)(E)

(b) (5), (b) (7)(E)

# Appendix A DETAILED TEST DATA AND RESULTS

## A.1 Background

This appendix presents specific MOE and MOS data referenced in the body of this report, which supports COI evaluation. Data are organized by COIs. Each Critical MOE or Critical MOS result are followed by the supporting data used to calculate the associated result. Validation success criteria and analysis methods used are described in appendix C of the IFT LUT Test Plan.

## A.2 Effectiveness COI

Data used in the LUT evaluation was collected from these sources:

- SIMEX
- DT Data
- LUT data collected from:
  - (b) (7)(E)
  - (b) (7)(E)
- CBP Live Operations data records (b) (7)(E) IoI target of opportunity detection events that occurred during live operations.

### A.2.1 COI E-1, CBP BORDER SECURITY

The CBP Border Security COI (E-1) was evaluated using the combined effect of the quantitative and qualitative measures associated with critical mission tasks Detect, Identify and Classify IoIs. This traceability for all measures is further described in Table E-1, Operational Requirements Traceability Matrix.

#### A.2.1.1 (b) (7)(E)

. System detection distances from the LUT DOE are presented in Tables A-3.1 to A-3.3.

**Table A-1: (b) (7)(E) Results Summary**

| | (b) (7)(E) | Results | |
|---|---|---|---|
| **Measure** | **Parameter** | **LUT Results** | **Threshold** |
| (b) (7)(E) | (b) (7)(E) | | |

(b) (7)(E)

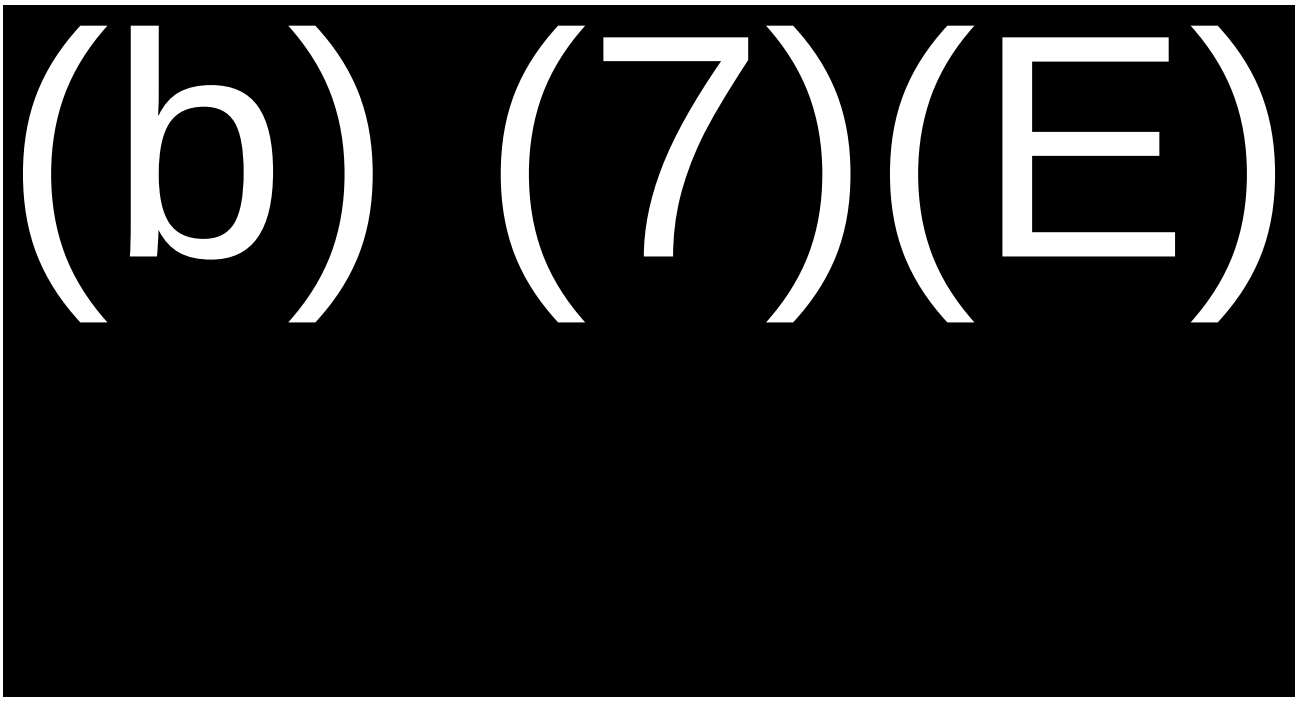



**Figure A-1:** (b) (7)(E)

(b) (7)(E)

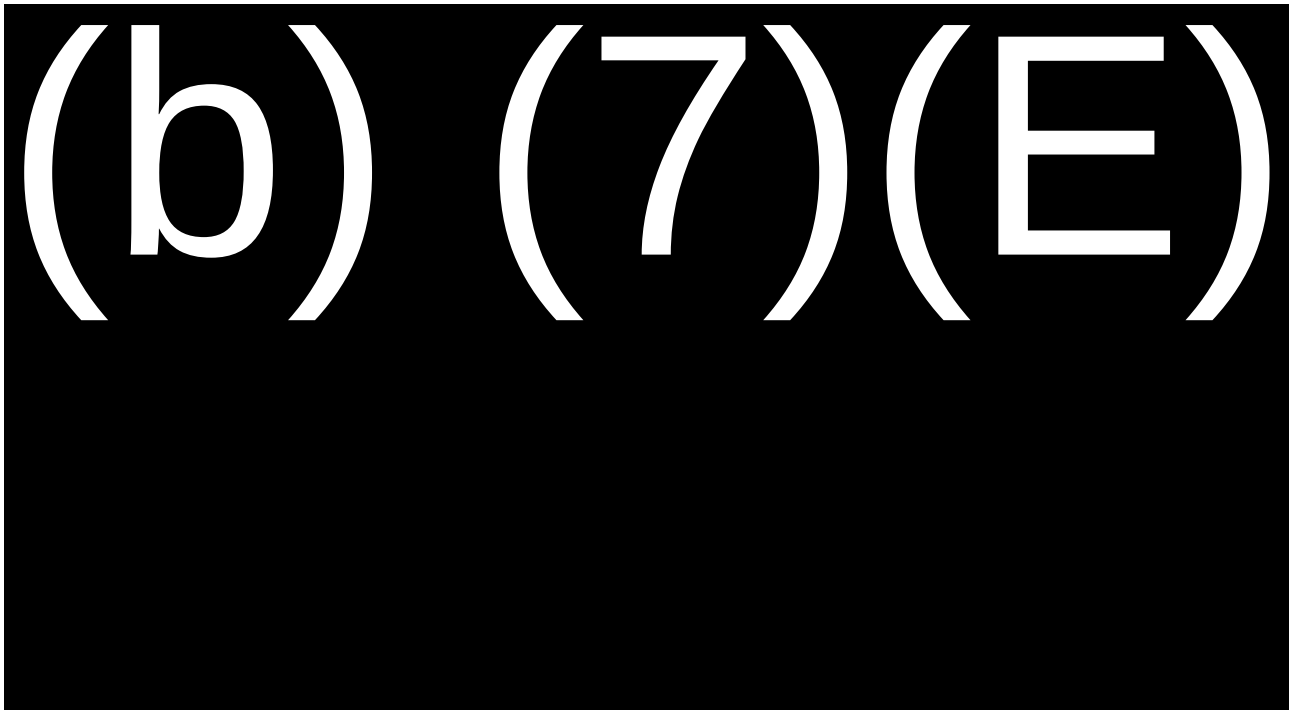



**Figure A-2:** (b) (7)(E)

### A.2.1.2 (b) (7)(E)

**Table A-2:** (b) (7)(E) **Results Summary**

| (b) (7)(E) | | Results | |
|---|---|---|---|
| **Measure** | **Parameter** | **LUT Results** | **Threshold** |
| (b) (7)(E) | (b) (7)(E) | | |

**Table A-3.1:** (b) (7)(E)

(b) (7)(E)

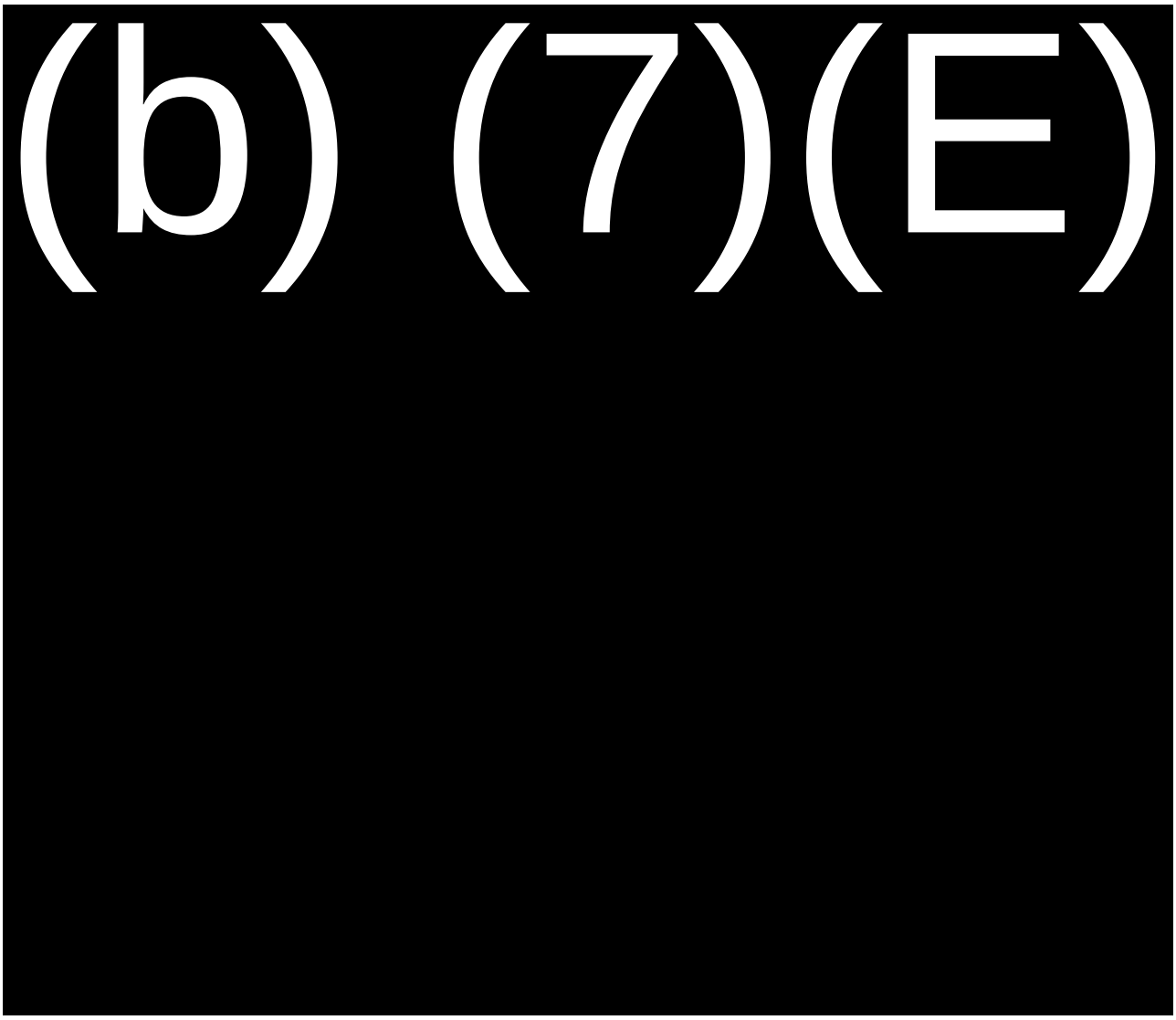

(b) (7)(E)

**Table A-3.2:** (b) (7)(E)

(b) (7)(E)

**Table A-3.3:** (b) (7)(E)

(b) (7)(E)

**A.2.1.3** (b) (7)(E)

(b) (7)(E)

**Table A-4:** (b) (7)(E) **Results Summary**

(b) (7)(E)

Figure A-3 depicts (b) (7)(E) (exclusive of data found in run comments).

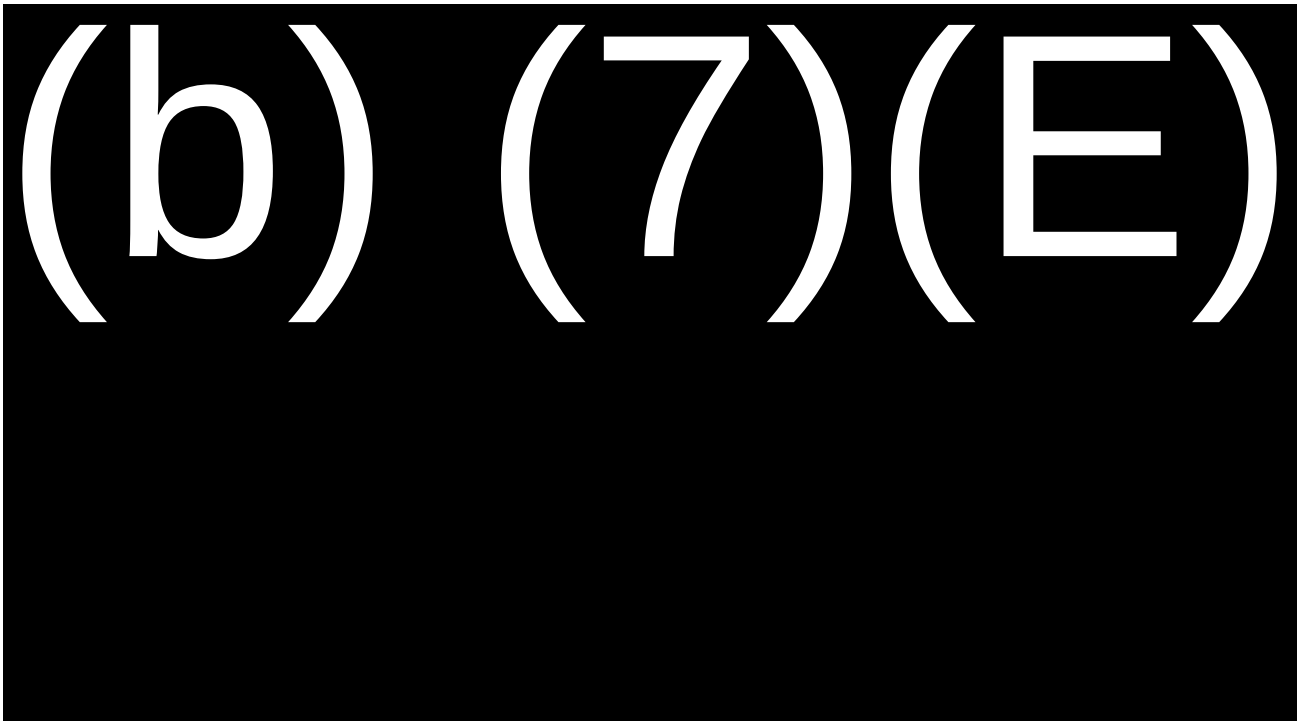



**Figure A-3:** (b) (7)(E)

**A.2.1.4** (b) (7)(E)

Test limitations that contributed to this are as follows:

1) (b) (7)(E)
2)
3)

(b) (7)(E)

Results are presented in Table A-5 and supporting data in Table A-6.

**Table A-5:** (b) (7)(E) **Results Summary**

**Table A-6:** (b) (7)(E)

(b) (7)(E)

**A.2.1.5** (b) (7)(E)

(b) (7)(E)

**Table A-7:** (b) (7)(E) **Results Summary**

(b) (7)(E)

Tables A-8 and A-9 contain the supporting data for (b) (7)(E).

**Table A-8:** (b) (7)(E)

(b) (7)(E)

**Table A-9:** (b) (7)(E)

(b) (7)(E)

(b) (7)(E)

**A.2.1.6** (b) (7)(E)

ively.

**Table A-10:** (b) (7)(E)

(b) (7)(E)

Table A-11 contains the supporting data for (b) (7)(E).

**Table A-11:** (b) (7)(E)

(b) (7)(E)

**A.2.1.7** (b) (7)(E)

(b) (7)(E)

.

As mentioned in Section 3.2 Table 5, (b) (7)(E)

**Table A-12:** (b) (7)(E)

(b) (7)(E)

**Table A-13:** (b) (7)(E)

(b) (7)(E)

Tables A-14 and A-15 contains the supporting data (b) (7)(E) (b) (7)(E).

**Table A-14:** (b) (7)(E)

(b) (7)(E)

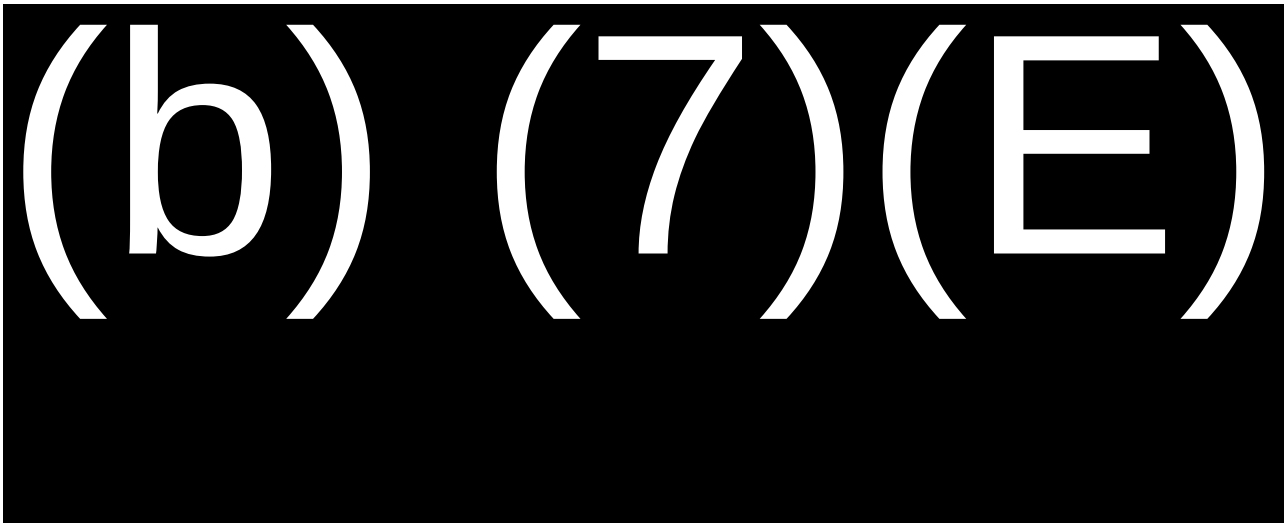
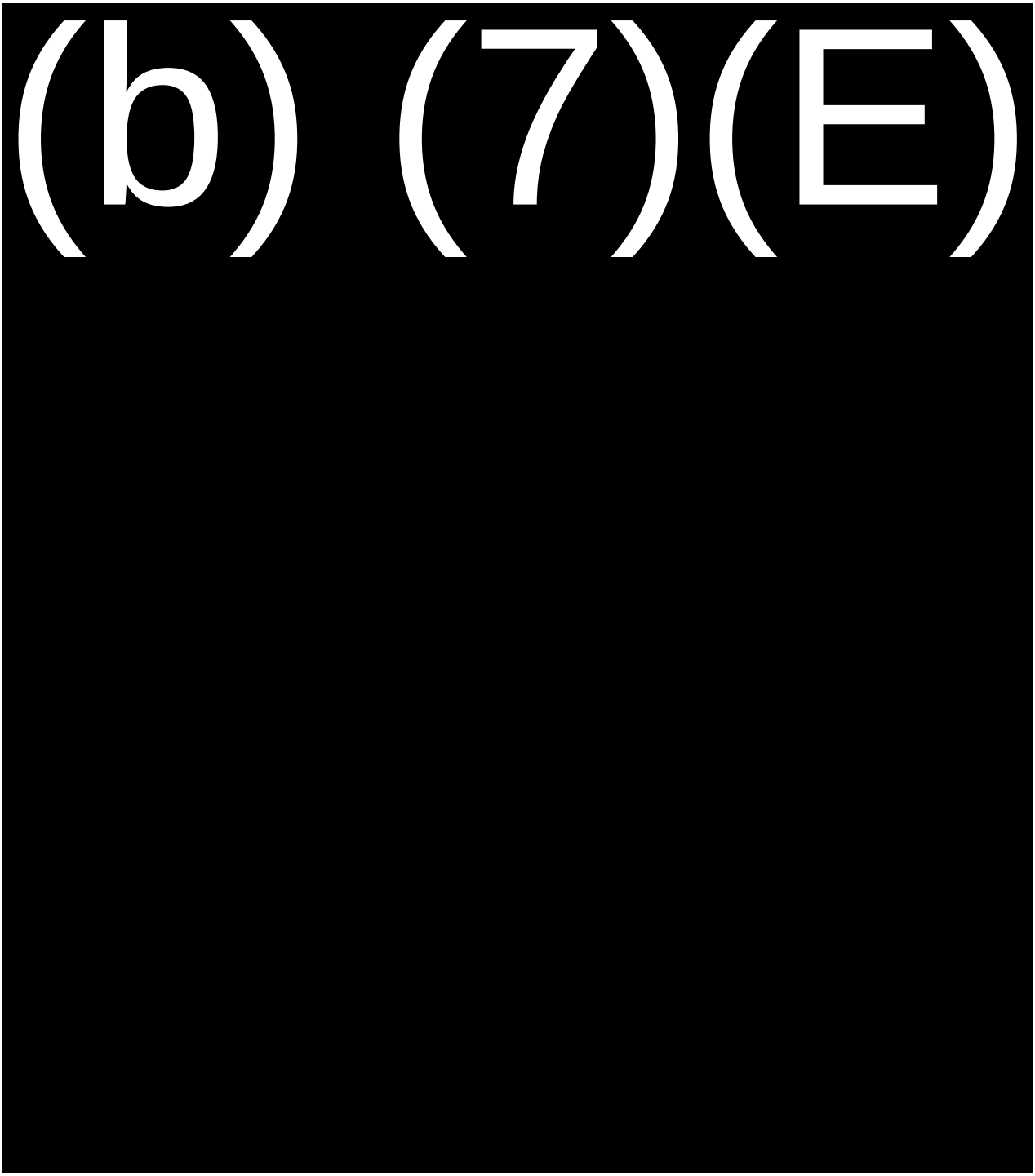

(b) (7)(E)

**Table A-15:** (b) (7)(E)



**A.2.1.8** (b) (7)(E)

(b) (7)(E)

**Table A-16:** (b) (7)(E)

(b) (7)(E)

**Table A-17:** (b) (7)(E)

(b) (7)(E)

## A.3 Suitability COIs

The suitability COIs used in the LUT include Reliability, Maintainability, Availability and Logistic Supportability.

### A.3.1 COI S-1 Reliability

#### A.3.1.1 (b) (7)(E)

[redacted]

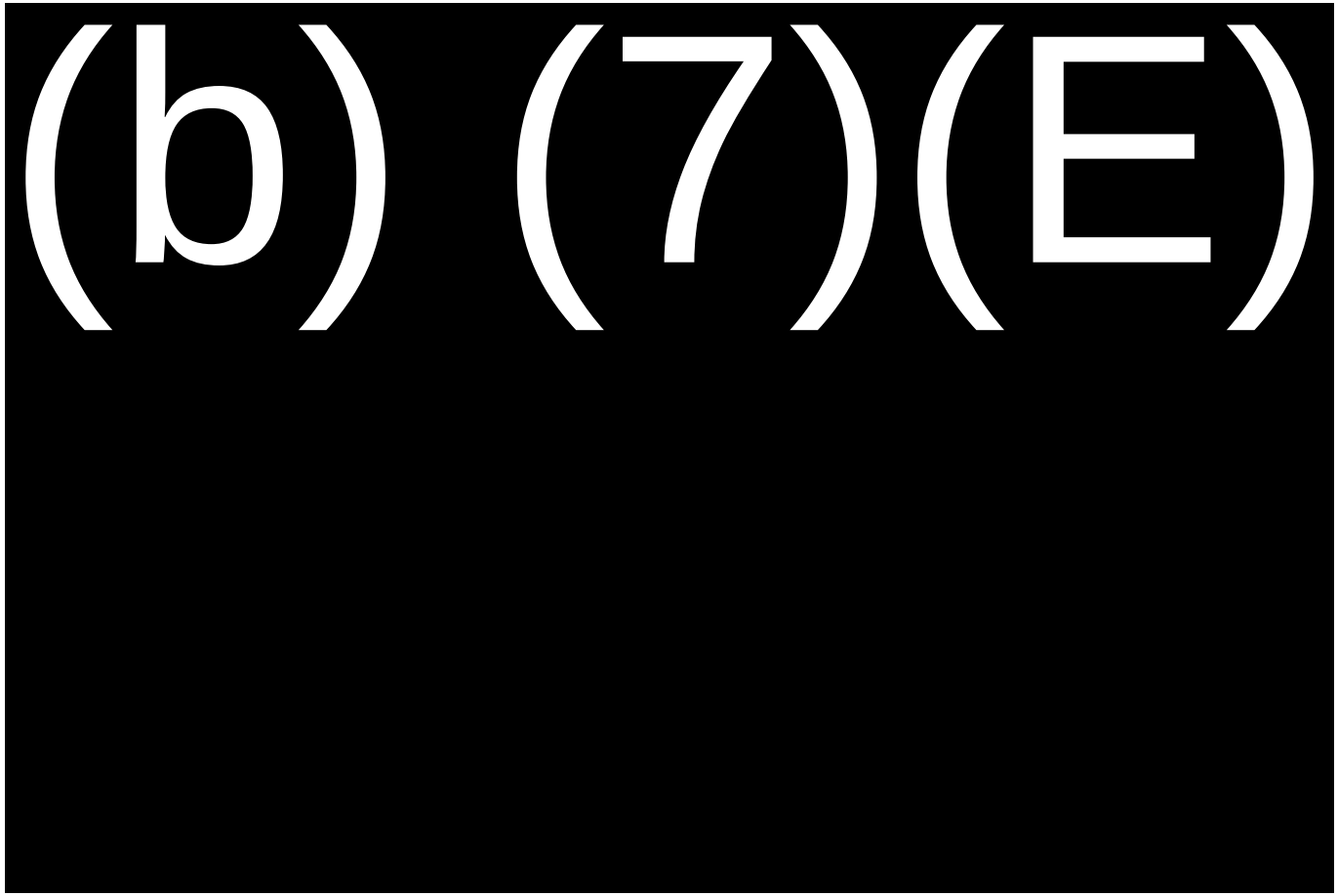
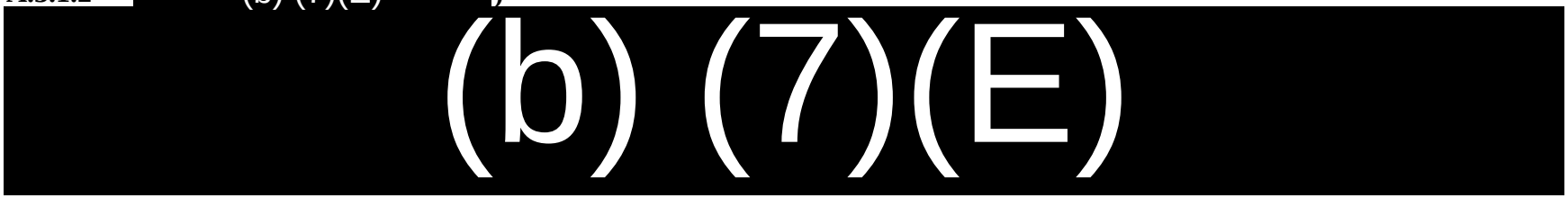



**Figure A-4:** (b) (7)(E)

### A.3.1.2 (b) (7)(E) )



(b) (7)(E)

**Table A-18: Reliability Results Summary**

| Reliability Results | | | |
|---|---|---|---|
| **Measure** | **Parameter** | **LUT Results** | **Threshold** |
| (b) (7)(E) | | | |

(b) (7)(E)

**Table A-19: SUT Critical Failure Log**

| SUT Critical Failure Log | | | | | | | |
|---|---|---|---|---|---|---|---|
| Date | **Element** | **FSTU #** | **Problem Description** | **Time Down** | **Fix Description** | **Time Up** | **Total Down Time** |
| (b) (7)(E) | | | | | | | |

| SUT Critical Failure Log | | | | | | | |
|---|---|---|---|---|---|---|---|
| Date | **Element** | **FSTU #** | **Problem Description** | **Time Down** | **Fix Description** | **Time Up** | **Total Down Time** |
| (b) (7)(E) | | | | | | | |

| SUT Critical Failure Log | | | | | | | |
|---|---|---|---|---|---|---|---|
| Date | **Element** | **FSTU #** | **Problem Description** | **Time Down** | **Fix Description** | **Time Up** | **Total Down Time** |

(b) (7)(E)

| SUT Critical Failure Log | | | | | | | |
|---|---|---|---|---|---|---|---|
| Date | **Element** | **FSTU #** | **Problem Description** | **Time Down** | **Fix Description** | **Time Up** | **Total Down Time** |
| (b) (7)(E) | | | | | | | |

| SUT Critical Failure Log | | | | | | | |
|---|---|---|---|---|---|---|---|
| Date | **Element** | **FSTU #** | **Problem Description** | **Time Down** | **Fix Description** | **Time Up** | **Total Down Time** |
| (b) (7)(E) | | | | | | | |

| SUT Critical Failure Log | | | | | | | |
|---|---|---|---|---|---|---|---|
| Date | **Element** | **FSTU #** | **Problem Description** | **Time Down** | **Fix Description** | **Time Up** | **Total Down Time** |
| (b) (7)(E) | | | | | | | |

Table A-20 provides a summary of LUT RAM Data.

**Table A-20: LUT RAM Data Summary**

| | |
|---|---|
| **System Total Time** | (b) (7)(E) |
| **System Uptime** | |
| **System Downtime** | |
| **Number of Critical Failures** | |
| **Mean Time Between Critical Failures** | |
| **Test Start Time** | |
| **Test End Time** | |
| **Mean Down Time** | |
| **System Availability Metric / FSTU Avail.** | |
| **Ao, Uptime to Total Time Ratio** | |

### A.3.2 COI S-2 Maintainability

IFT Maintainability was evaluated using the following Measure: (b) (7)(E) MDT. Mean Down Time is defined as the average time that the IFT System, C2CEN, an FSTU, or other Line Replaceable Unit (LRU) or other equipment is not operational due to repair or preventive maintenance. Suitability data were collected during the 15-day LUT period. The IFT uses Contractor Maintenance Logistic Support. Results are presented in Table A-21.

**Table A-21: Maintainability Results Summary**

| Maintainability Results Summary | | | |
|---|---|---|---|
| **Measure** | **Parameter** | **LUT Results** | **Threshold** |
| Maintainability (b) (7)(E) | MDT | (b) (7)(E) | |

(b) (7)(E)

(b) (7)(E)

### A.3.3 COI S-3 Availability

IFT Availability was evaluated using the following Measures: (b) (7)(E) System Availability Metric (SAM) and ORD (b) (7)(E). SAM is calculated as the product of the C2CEN's availability multiplied by the combined average availabilities of all the FSTUs. A system is considered operationally available when it can perform per the operational requirements. A system is unavailable under normal operating conditions that preclude detecting, tracking, identifying, or classifying IoIs within an AoC (when the system would otherwise be capable of doing so).

Availability data were collected during the 15-day LUT period. (b) (7)(E)

The IFT uses Contractor Maintenance Logistics Support. LUT Results are presented in table A-22.

**Table A-22: IFT Availability**

| Availability Results Summary | | | |
|---|---|---|---|
| **Measure** | **Parameter** | **LUT Results** | **Threshold** |
| System Availability Metric (b) (7)(E) | SAM | (b) (7)(E) | |
| Operational Availability ORD (b) (7)(E) | Ao | | |

### A.3.4 COI S-4 Logistic Supportability

IFT logistic supportability was evaluated using the following Measure: (b) (7)(E) The IFT system support provides 24/7 on-call technical assistance. Contractor call center personnel were observed to assist CBP personnel with technical issues when operators requested technical assistance. Table A-23 presents the Logistic Supportability Results Summary.

**Table A-23: IFT Logistic Supportability Summary**

| IFT Logistic Supportability Summary | | | |
|---|---|---|---|
| **Measure** | **Parameter** | **LUT Results** | **Threshold** |
| Logistic Supportability (b) (7)(E) | The IFT system support provides 24/7 on-call technical assistance | SAT | No threshold |

## A.4 (b) (7)(E)

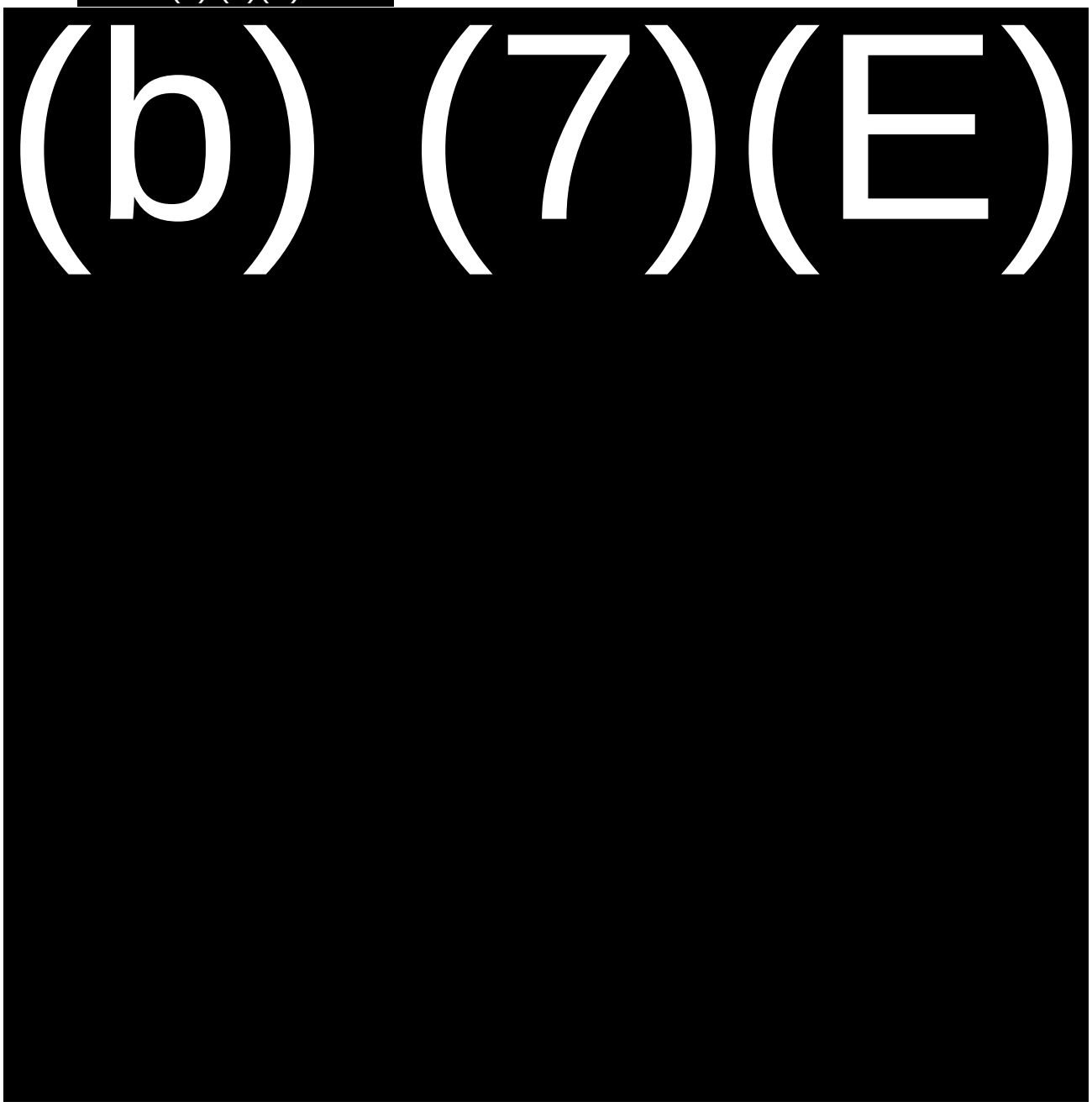


**Table A-25** (b) (7)(E)

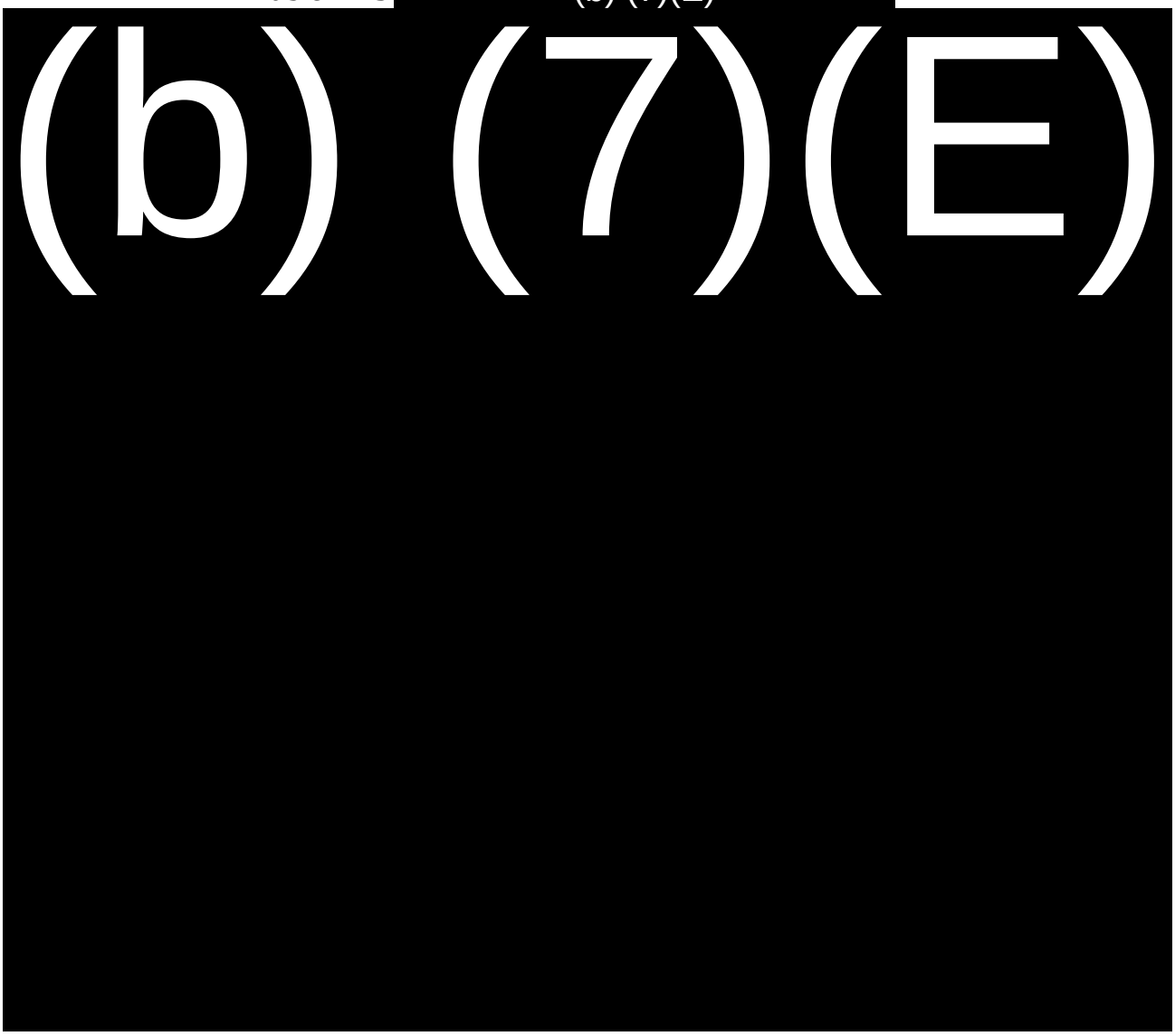
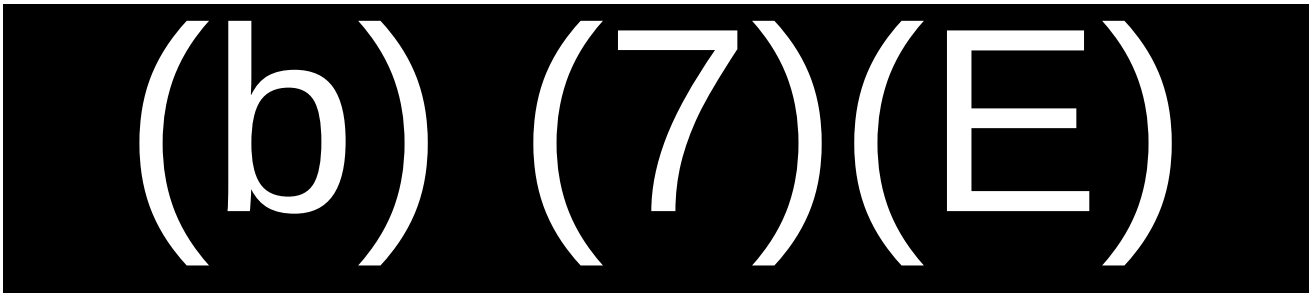



**Figure A-6:** (b) (7)(E)

**Table A-26** (b) (7)(E)



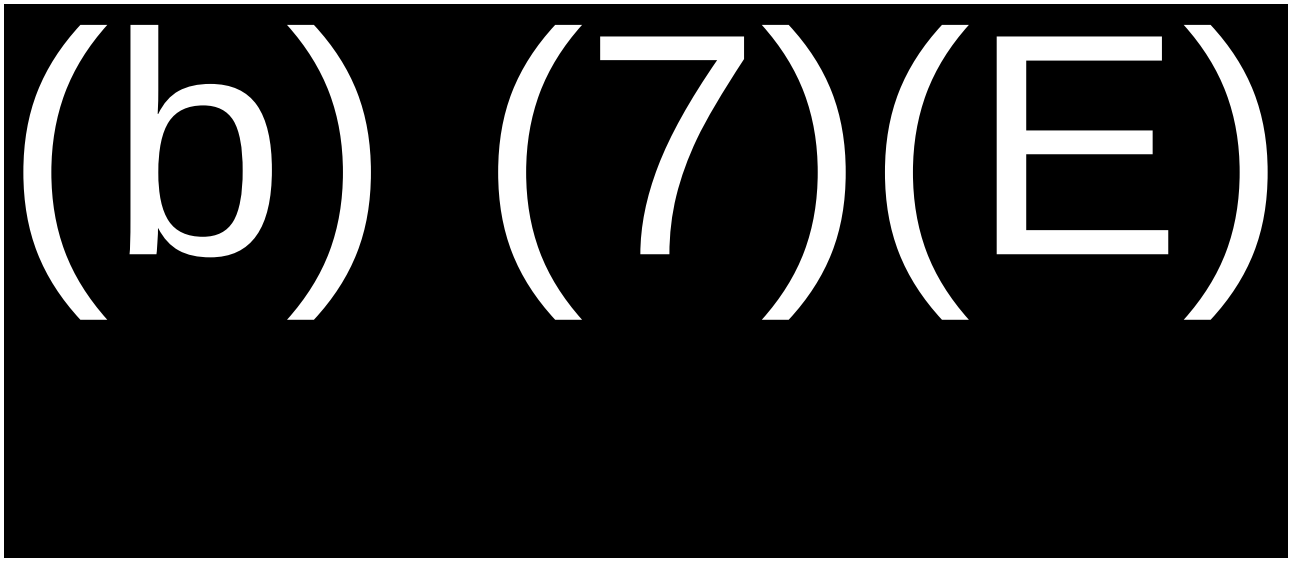



**Figure A-7:** (b) (7)(E)

# Appendix B EVALUATION METHODOLOGY

## B.1 Test Conduct

The LUT was designed to collect data and evaluate IFT performance with respect to the COIs defined in Section 1. USBP Agents operated the system in the (b) (7)(E) AoR. The system was maintained using the contractor maintenance and logistics support. Personnel from OEB, ITO and USBP conducted the test event.

The contractor developed and conducted three different training events for the operators. Deployment training was conducted the week subsequent to the SAT. A two-day training event was conducted while the system was operational. During a two-day period, operators received 4-hour training sessions on the simulator. Some operators did not participate in all training events.

There was no consistency in scheduling operators to man the IFT workstations in the C2CEN. (b) (7)(E) . This was determined by shift supervisor during the pre-shift muster.

Test team members participated in-group walks with BPAs, (b) (7)(E) (b) (7)(E) .

Using the Continuous Operational Evaluation approach, the test team observed the System Acceptance Test (SAT) in June 2015. The ITO provided a Letter of Observation (LOO) based on their observations. The ITO Test Director participated in the operator deployment training. The test team also observed 1-week of the scheduled 2-week Operator Evaluation event.

## B.2 Event Deviations

The following test plan event deviations occurred during the test:

- (b) (7)(E)

(b) (7)(E) . The full event schedule as executed is found in Appendix C.

## B.3 Limitations

### B.3.1 Major

There were no major limitations to test.

### B.3.2 Minor

The following minor limitation(s) had minimal impact on COI resolution and did not impact the ability to form conclusions regarding effectiveness and suitability:

#### B.3.2.1 Border Security, Cybersecurity (E-1)

(b) (7)(E)

#### B.3.2.2 Border Security, Detect (E-1)

(b) (7)(E) .

#### B.3.2.3 Border Security, Detect (E-1)

(b) (7)(E)

#### B.3.2.4 Border Security, Detect (E-1)

(b) (7)(E)

#### B.3.2.5 Border Security, Detect (E-1)

(b) (7)(E)

## B.4 OEB Evaluation Process

This LUT report provides a determination of effectiveness and suitability of the IFT system in the (b) (7)(E) AZ operational environment. The evaluation was based on the Continuous Operational Evaluation approach of the SUT, as observed during multiple integrated test periods and culminating in the dedicated LUT period. This was accomplished by using a Mission-Based Test Design (MBTD), developed in a trial process within OEB and documented in the draft IFT Integrated Evaluation Framework (IEF). The evaluation review process established in the LUT

Plan, presents a standardized, repeatable evaluative process for SUT performance, in order to: classify issues, characterize deficiencies, make overall COI resolutions, determine effectiveness and suitability, and make system deployment recommendations.

### B.4.1 Definitions

OEB used the following definitions throughout the evaluation process.

#### B.4.1.1 SUT Deficiencies

Deficiencies noted during test that can be directly tied back to a specified or derived requirement that the USBP sponsor has funded the PM to deliver are listed in SUT deficiency paragraphs under the applicable COIs. The SUT evaluation was based on the contribution of the SUT, as defined by specified and derived requirements, to the SoS. SUT deficiencies were used in the resolution of appropriate COIs, SUT operational effectiveness and suitability determinations, and deployment recommendations.

#### B.4.1.2 SoS Deficiencies

Deficiencies noted during test that cannot be directly tied back to a threshold or derived requirement, but are necessary for mission accomplishment of the SUT when operating in the SoS environment, or are required for the full employment of the SUT in its intended SoS operating environment are listed in SoS deficiency paragraphs under the applicable COIs. SoS deficiencies were used in the resolution of appropriate COIs, and the SoS operational effectiveness and suitability determinations. However, there were no SoS issues identified during this test.

#### B.4.1.3 Deficiency

A deficiency is defined as lacking in some necessary quality, capability, or element or not up to a normal standard or complement. Operational capability is defined as an ability or means that is directly traceable to an approved requirement (i.e., ORD, FSD, CONOPS, etc.). Mission-essential capability is defined as an ability that is inherently necessary to complete an assigned mission.

#### B.4.1.4 Workaround

The particular issue can be resolved with additional training and/or experience such that the operator knows to do something (or not do something) that is otherwise not part of the normal training syllabus (operator compensation), or the operator solves the issue by taking some alternative course of action to accomplish the same result (work-around). To be acceptable, it must be an action, or series of actions, that can reasonably be accomplished by an average operator without excessive impact to other capabilities. It is important to note that operator compensation and work-around can be engineered into the training for system operators. An acceptable work-around cannot avoid use of the system.

#### B.4.1.5 Operational Consideration (OPCON)

OPCONs are used to document tactical considerations that inform supervisors of significant aspects (pro and con) of system employment, or make clear what special measures would be required to make the system more effective in operational use. Although it may present

supporting data or examples, it is not a deficiency paragraph by another name. It is a recommendation for the user to consider in the employment or management of the SUT and/or SoS in operational use.

#### B.4.1.6 Deficiency Evaluation Process

Figure B-1 contains the SUT and SoS baseline deficiency definitions flow diagram used throughout the evaluation process.

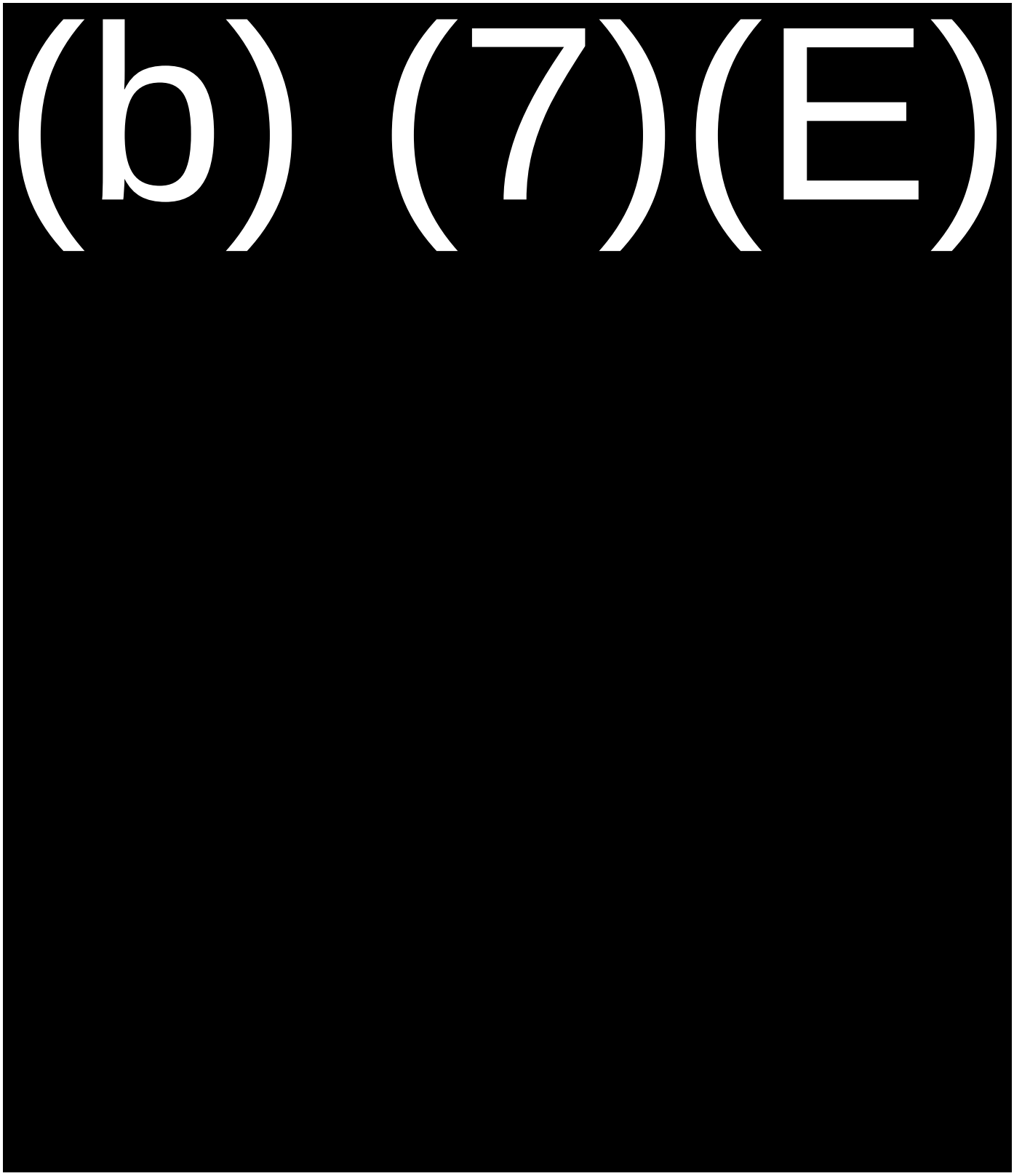



**Figure B-1: Baseline Deficiency Definition Flow Diagram**

#### B.4.1.7 COI Evaluation

The resolution of COIs is addressed by satisfying the questions posed by the COIs. Derived from the MBTD process and IEF, the test plan provides an audit trail from the COI questions through the critical mission tasks to the critical system attributes and measures. This trail provides a logical flow path so that the disposition of COIs is directly related to the evaluation of each designed test. Thus, when a test parameter is quantitative, the COI resolution is based on actual results relative to the operational threshold. For non-quantifiable parameters, the COI resolution must be based on two factors: (1) observed results and (2) operational experience and judgment. Additionally, the number and severity of the deficiencies and their cumulative/aggregate impact on mission performance associated with the COI is considered for COI resolution. The resolution of COIs should be a subjective assessment of COI results by comparing adverse results against the full scope of the COI. In the end, the case should be clearly made to support weighing the positive test outcomes versus the negative outcomes for the critical mission tasks and subtasks. The audience should come away with a firm understanding as to why the scales tipped to either the positive (satisfactory) or negative (unsatisfactory). Potential COI resolution conclusions include: Resolved SAT or UNSAT, Unresolved, Split Resolution, or Not Tested.

##### B.4.1.7.1 Met

The COI was tested and resolved either SAT or UNSAT

##### B.4.1.7.2 Met with Exception

Used when a COI requires further testing for final resolution due to a major or severe limitation. This is used when the COI has been tested, but cannot be resolved.

##### B.4.1.7.3 Not Met

Used only when the COI was not tested during the particular phase of testing in which it was an issue for resolution. This may be due to the absence of a key test resource that poses a major or severe limitation to the test of the COI or it may be due to a decision by the Resource Sponsor to defer testing of certain aspects of the SUT until a future test period.

##### B.4.1.7.4 Effectiveness

Effectiveness is a combination of two concepts: does the system meet requirements and does the system maintain or improve mission capability when used by the operators. The evaluation of effectiveness is always a combination of these concepts. A good rule of thumb is: will the system make the user more effective than he/she was before?

##### B.4.1.7.5 Effective / Suitable

Ideally, all effectiveness / suitability COIs were completely and satisfactorily resolved, and there were no severe or major (1, 2, or 3) deficiencies. However, through the evaluative process, it is possible for the system to be determined effective / suitable with one or more major (1, 2, or 3) deficiencies and/or unsatisfactory COI resolutions. If as a result of deferrals or limitations to test, there are COIs or portions of COIs that remain unresolved/not tested, characterize the system effectiveness / suitability as accurately as possible and recommend additional OT&E to resolve these areas.

#### B.4.1.7.6 Not Effective

Regardless of the SUT performance when compared to the KPPs and the KSAs, if the operator is unable to successfully employ the system to accomplish the mission, it will be deemed not effective.

#### B.4.1.7.7 Not Suitable

Regardless of the SUT performance when compared to the KPPs and the KSAs, if the operator is unable to successfully maintain and sustain the system to deliver the required mission capability, it will be deemed not suitable.

## Appendix C DETAILED TEST EXECUTION SCHEDULE

Table C-1 presents the detailed LUT daily test schedule as executed.

**Table C-1: Daily Test Run Schedule**

| Vignette | Run | IoI Type | IoI# | IoI Approach | (b) (7)(E) |
|---|---|---|---|---|---|
| 1-2 | (b) (7)(E) | | | | |

| Vignette | Run | IoI Type | IoI# | IoI Approach | (b) (7)(E) |
|---|---|---|---|---|---|
| | (b) (7)(E) | | | | |

| Vignette | Run | IoI Type | IoI# | IoI Approach | (b) (7)(E) |
|---|---|---|---|---|---|
| | (b) (7)(E) | | | | |

| Vignette | Run | IoI Type | IoI# | IoI Approach | (b) (7)(E) |
|---|---|---|---|---|---|
| | | | | | |
| | 1-3 | | | | |
| | 1-4 | | | | |

| Vignette | Run | IoI Type | IoI# | IoI Approach | (b) (7)(E) |
|---|---|---|---|---|---|
| | | | | | (b) (7)(E) |
| | 1-2 | | | | |

## Appendix D OPERATIONAL REQUIREMENTS MATRIX

Table D-1 provides a summary trace of operational requirements to Validated (SAT) or Failed (UNSAT) measures of effectiveness and suitability, LUT results, and threshold success criterion.

**Table D-1: Operational Requirements Traceability Matrix**

| ID# | Attribute | Source | Para | M# | Standard | | LUT Result | Type |
|---|---|---|---|---|---|---|---|---|
| | | | | | Measure | Criterion | | |
| MOEs | | | | | | | | |
| A1 | (b) (7)(E) | | | | | | | |

| ID# | Attribute | Source | Para | M# | Standard | | LUT Result | Type |
|---|---|---|---|---|---|---|---|---|
| | | | | | Measure | Criterion | | |
| | (b) (7)(E) | | | | | | | |
| A2 | | | | | | | | |

| ID# | Attribute | Source | Para | M# | Standard | | LUT Result | Type |
|---|---|---|---|---|---|---|---|---|
| | | | | | Measure | Criterion | | |
| | (b) (7)(E) | | | | | | | |
| A3 | | | | | | | | |
| A4 | | | | | | | | |

| ID# | Attribute | Source | Para | M# | Standard | | LUT Result | Type |
|---|---|---|---|---|---|---|---|---|
| | | | | | Measure | Criterion | | |
| A5 | (b) (7)(E) | | | | | | | |

| ID# | Attribute | Source | Para | M# | Standard | | LUT Result | Type |
|---|---|---|---|---|---|---|---|---|
| | | | | | Measure | Criterion | | |
| | (b) (7)(E) | | | | | | | |

| ID# | Attribute | Source | Para | M# | Standard | | LUT Result | Type |
|---|---|---|---|---|---|---|---|---|
| | | | | | Measure | Criterion | | |
| | (b) (7)(E) | | | | | | | |

| ID# | Attribute | Source | Para | M# | Standard | | LUT Result | Type |
|---|---|---|---|---|---|---|---|---|
| | | | | | Measure | Criterion | | |
| | (b) (7)(E) | | | | | | | |

| ID# | Attribute | Source | Para | M# | Standard | | LUT Result | Type |
|---|---|---|---|---|---|---|---|---|
| | | | | | Measure | Criterion | | |
| | (b) (7)(E) | | | | | | | |

| ID# | Attribute | Source | Para | M# | Standard | | LUT Result | Type |
|---|---|---|---|---|---|---|---|---|
| | | | | | Measure | Criterion | | |
| (b)(7)(E) | | | | | | | | |

| ID# | Attribute | Source | Para | M# | Standard | | LUT Result | Type |
|---|---|---|---|---|---|---|---|---|
| | | | | | Measure | Criterion | | |
| | (b) (7)(E) | | | | | | | |

| ID# | Attribute | Source | Para | M# | Standard | | LUT Result | Type |
|---|---|---|---|---|---|---|---|---|
| | | | | | Measure | Criterion | | |
| | (b) (7)(E) | | | | | | | |

| ID# | Attribute | Source | Para | M# | Standard | | LUT Result | Type |
|---|---|---|---|---|---|---|---|---|
| | | | | | Measure | Criterion | | |
| | (b) (7)(E) | | | | | | | |

| ID# | Attribute | Source | Para | M# | Standard | | LUT Result | Type |
|---|---|---|---|---|---|---|---|---|
| | | | | | Measure | Criterion | | |
| | (b) (7)(E) | | | | | | | |

| ID# | Attribute | Source | Para | M# | Standard | | LUT Result | Type |
|---|---|---|---|---|---|---|---|---|
| | | | | | Measure | Criterion | | |
| | (b) (7)(E) | | | | | | | |

| ID# | Attribute | Source | Para | M# | Standard | | LUT Result | Type |
|---|---|---|---|---|---|---|---|---|
| | | | | | Measure | Criterion | | |
| | (b) (7)(E) | | | | | | | |
| A6 | | | | | | | | |

| ID# | Attribute | Source | Para | M# | Standard | | LUT Result | Type |
|---|---|---|---|---|---|---|---|---|
| | | | | | Measure | Criterion | | |
| (b)(7)(E) | | | | | | | | |

| ID# | Attribute | Source | Para | M# | Standard | | LUT Result | Type |
|---|---|---|---|---|---|---|---|---|
| | | | | | Measure | Criterion | | |
| | (b) (7)(E) | | | | | | | |

| ID# | Attribute | Source | Para | M# | Standard | | LUT Result | Type |
|---|---|---|---|---|---|---|---|---|
| | | | | | Measure | Criterion | | |
| | (b) (7)(E) | | | | | | | |

| ID# | Attribute | Source | Para | M# | Standard | | LUT Result | Type |
|---|---|---|---|---|---|---|---|---|
| | | | | | Measure | Criterion | | |
| (b) (7)(E) | | | | | | | | |

| ID# | Attribute | Source | Para | M# | Standard | | LUT Result | Type |
|---|---|---|---|---|---|---|---|---|
| | | | | | Measure | Criterion | | |
| A7 | (b) (7)(E) | | | | | | | |

| ID# | Attribute | Source | Para | M# | Standard | | LUT Result | Type |
|---|---|---|---|---|---|---|---|---|
| | | | | | Measure | Criterion | | |
| (b) (7)(E) | | | | | | | | |

| ID# | Attribute | Source | Para | M# | Standard | | LUT Result | Type |
|---|---|---|---|---|---|---|---|---|
| | | | | | Measure | Criterion | | |
| | (b) (7)(E) | | | | | | | |

| ID# | Attribute | Source | Para | M# | Standard | | LUT Result | Type |
|---|---|---|---|---|---|---|---|---|
| | | | | | Measure | Criterion | | |
| | (b) (7)(E) | | | | | | | |
| A8 | | | | | | | | |

| ID# | Attribute | Source | Para | M# | Standard | | LUT Result | Type |
|---|---|---|---|---|---|---|---|---|
| | | | | | Measure | Criterion | | |
| | (b) (7)(E) | | | | | | | |
| A9 | | | | | | | | |

| ID# | Attribute | Source | Para | M# | Standard | | LUT Result | Type |
|---|---|---|---|---|---|---|---|---|
| | | | | | Measure | Criterion | | |
| | | (b) (7)(E) | | | | | | |

| ID# | Attribute | Source | Para | M# | Standard | | LUT Result | Type |
|---|---|---|---|---|---|---|---|---|
| | | | | | Measure | Criterion | | |
| | (b) (7)(E) | | | | | | | |

| ID# | Attribute | Source | Para | M# | Standard | | LUT Result | Type |
|---|---|---|---|---|---|---|---|---|
| | | | | | Measure | Criterion | | |
| | (b) (7)(E) | | | | | | | |

| ID# | Attribute | Source | Para | M# | Standard | | LUT Result | Type |
|---|---|---|---|---|---|---|---|---|
| | | | | | Measure | Criterion | | |
| | (b) (7)(E) | | | | | | | |

| ID# | Attribute | Source | Para | M# | Standard | | LUT Result | Type |
|---|---|---|---|---|---|---|---|---|
| | | | | | Measure | Criterion | | |
| (b) (7)(E) | | | | | | | | |

| ID# | Attribute | Source | Para | M# | Standard | | LUT Result | Type |
|---|---|---|---|---|---|---|---|---|
| | | | | | Measure | Criterion | | |
| | (b) (7)(E) | | | | | | | |

| ID# | Attribute | Source | Para | M# | Standard | | LUT Result | Type |
|---|---|---|---|---|---|---|---|---|
| | | | | | Measure | Criterion | | |
| | (b) (7)(E) | | | | | | | |

| ID# | Attribute | Source | Para | M# | Standard | | LUT Result | Type |
|---|---|---|---|---|---|---|---|---|
| | | | | | Measure | Criterion | | |
| (b) (7)(E) | | | | | | | | |

| ID# | Attribute | Source | Para | M# | Standard | | LUT Result | Type |
|---|---|---|---|---|---|---|---|---|
| | | | | | Measure | Criterion | | |
| (b) (7)(E) | | | | | | | | |

| ID# | Attribute | Source | Para | M# | Standard | | LUT Result | Type |
|---|---|---|---|---|---|---|---|---|
| | | | | | Measure | Criterion | | |
| (b) (7)(E) | | | | | | | | |

| ID# | Attribute | Source | Para | M# | Standard | | LUT Result | Type |
|---|---|---|---|---|---|---|---|---|
| | | | | | Measure | Criterion | | |
| (b) (7)(E) | | | | | | | | |

| ID# | Attribute | Source | Para | M# | Standard | | LUT Result | Type |
|---|---|---|---|---|---|---|---|---|
| | | | | | Measure | Criterion | | |
| | (b) (7)(E) | | | | | | | |

| ID# | Attribute | Source | Para | M# | Standard | | LUT Result | Type |
|---|---|---|---|---|---|---|---|---|
| | | | | | Measure | Criterion | | |
| (b) (7)(E) | | | | | | | | |

| ID# | Attribute | Source | Para | M# | Standard | | LUT Result | Type |
|---|---|---|---|---|---|---|---|---|
| | | | | | Measure | Criterion | | |
| | (b) (7)(E) | | | | | | | |

| ID# | Attribute | Source | Para | M# | Standard | | LUT Result | Type |
|---|---|---|---|---|---|---|---|---|
| | | | | | Measure | Criterion | | |
| | (b) (7)(E) | | | | | | | |

| ID# | Attribute | Source | Para | M# | Standard | | LUT Result | Type |
|---|---|---|---|---|---|---|---|---|
| | | | | | Measure | Criterion | | |
| (b) (7)(E) | | | | | | | | |

| ID# | Attribute | Source | Para | M# | Standard | | LUT Result | Type |
|---|---|---|---|---|---|---|---|---|
| | | | | | Measure | Criterion | | |
| (b) (7)(E) | | | | | | | | |

| ID# | Attribute | Source | Para | M# | Standard | | LUT Result | Type |
|---|---|---|---|---|---|---|---|---|
| | | | | | Measure | Criterion | | |
| (b)(7)(E) | | | | | | | | |

| ID# | Attribute | Source | Para | M# | Standard | | LUT Result | Type |
|---|---|---|---|---|---|---|---|---|
| | | | | | Measure | Criterion | | |
| | (b) (7)(E) | | | | | | | |

| ID# | Attribute | Source | Para | M# | Standard | | LUT Result | Type |
|---|---|---|---|---|---|---|---|---|
| | | | | | Measure | Criterion | | |
| | (b) (7)(E) | | | | | | | |

| ID# | Attribute | Source | Para | M# | Standard | | LUT Result | Type |
|---|---|---|---|---|---|---|---|---|
| | | | | | Measure | Criterion | | |
| A10 | (b)(7)(E) | | | | | | | |

| ID# | Attribute | Source | Para | M# | Standard | | LUT Result | Type |
|---|---|---|---|---|---|---|---|---|
| | | | | | Measure | Criterion | | |
| | (b) (7)(E) | | | | | | | |

| ID# | Attribute | Source | Para | M# | Standard | | LUT Result | Type |
|---|---|---|---|---|---|---|---|---|
| | | | | | Measure | Criterion | | |
| | (b) (7)(E) | | | | | | | |
| A1 1 | | | | | | | | |

| ID# | Attribute | Source | Para | M# | Standard | | LUT Result | Type |
|---|---|---|---|---|---|---|---|---|
| | | | | | Measure | Criterion | | |
| | (b) (7)(E) | | | | | | | |

| ID# | Attribute | Source | Para | M# | Standard | | LUT Result | Type |
|---|---|---|---|---|---|---|---|---|
| | | | | | Measure | Criterion | | |
| (b) (7)(E) | | | | | | | | |

| ID# | Attribute | Source | Para | M# | Standard | | LUT Result | Type |
|---|---|---|---|---|---|---|---|---|
| | | | | | Measure | Criterion | | |
| | (b) (7)(E) | | | | | | | |

| ID# | Attribute | Source | Para | M# | Standard | | LUT Result | Type |
|---|---|---|---|---|---|---|---|---|
| | | | | | Measure | Criterion | | |
| (b) (7)(E) | | | | | | | | |

| ID# | Attribute | Source | Para | M# | Standard | | LUT Result | Type |
|---|---|---|---|---|---|---|---|---|
| | | | | | Measure | Criterion | | |
| | (b) (7)(E) | | | | | | | |

| ID# | Attribute | Source | Para | M# | Standard | | LUT Result | Type |
|---|---|---|---|---|---|---|---|---|
| | | | | | Measure | Criterion | | |
| A12 | (b)(7)(E) | | | | | | | |

| ID# | Attribute | Source | Para | M# | Standard | | LUT Result | Type |
|---|---|---|---|---|---|---|---|---|
| | | | | | Measure | Criterion | | |
| | (b) (7)(E) | | | | | | | |

| ID# | Attribute | Source | Para | M# | Standard | | LUT Result | Type |
|---|---|---|---|---|---|---|---|---|
| | | | | | Measure | Criterion | | |
| (b) (7)(E) | | | | | | | | |

| ID# | Attribute | Source | Para | M# | Standard | | LUT Result | Type |
|---|---|---|---|---|---|---|---|---|
| | | | | | Measure | Criterion | | |
| (b) (7)(E) | | | | | | | | |

| ID# | Attribute | Source | Para | M# | Standard | | LUT Result | Type |
|---|---|---|---|---|---|---|---|---|
| | | | | | Measure | Criterion | | |
| | (b) (7)(E) | | | | | | | |
| A13 | | | | | | | | |

| ID# | Attribute | Source | Para | M# | Standard | | LUT Result | Type |
|---|---|---|---|---|---|---|---|---|
| | | | | | Measure | Criterion | | |
| | (b) (7)(E) | | | | | | | |

| ID# | Attribute | Source | Para | M# | Standard | | LUT Result | Type |
|---|---|---|---|---|---|---|---|---|
| | | | | | Measure | Criterion | | |
| (b) (7)(E) | | | | | | | | |

| ID# | Attribute | Source | Para | M# | Standard | | LUT Result | Type |
|---|---|---|---|---|---|---|---|---|
| | | | | | Measure | Criterion | | |
| | (b) (7)(E) | | | | | | | |
| A14 | | | | | | | | |

| ID# | Attribute | Source | Para | M# | Standard | | LUT Result | Type |
|---|---|---|---|---|---|---|---|---|
| | | | | | Measure | Criterion | | |
| (b) (7)(E) | | | | | | | | |

| ID# | Attribute | Source | Para | M# | Standard | | LUT Result | Type |
|---|---|---|---|---|---|---|---|---|
| | | | | | Measure | Criterion | | |
| | (b) (7)(E) | | | | | | | |
| A15 | | | | | | | | |

| ID# | Attribute | Source | Para | M# | Standard | | LUT Result | Type |
|---|---|---|---|---|---|---|---|---|
| | | | | | Measure | Criterion | | |
| | (b) (7)(E) | | | | | | | |

| ID# | Attribute | Source | Para | M# | Standard | | LUT Result | Type |
|---|---|---|---|---|---|---|---|---|
| | | | | | Measure | Criterion | | |
| | (b) (7)(E) | | | | | | | |

| ID# | Attribute | Source | Para | M# | Standard | | LUT Result | Type |
|---|---|---|---|---|---|---|---|---|
| | | | | | Measure | Criterion | | |
| (b) (7)(E) | | | | | | | | |

| ID# | Attribute | Source | Para | M# | Standard | | LUT Result | Type |
|---|---|---|---|---|---|---|---|---|
| | | | | | Measure | Criterion | | |
| | (b) (7)(E) | | | | | | | |

| ID# | Attribute | Source | Para | M# | Standard | | LUT Result | Type |
|---|---|---|---|---|---|---|---|---|
| | | | | | Measure | Criterion | | |
| (b) (7)(E) | | | | | | | | |

| ID# | Attribute | Source | Para | M# | Standard | | LUT Result | Type |
|---|---|---|---|---|---|---|---|---|
| | | | | | Measure | Criterion | | |
| (b) (7)(E) | | | | | | | | |

| ID# | Attribute | Source | Para | M# | Standard | | LUT Result | Type |
|---|---|---|---|---|---|---|---|---|
| | | | | | Measure | Criterion | | |
| A16 | (b)(7)(E) | | | | | | | |

| ID# | Attribute | Source | Para | M# | Standard | | LUT Result | Type |
|---|---|---|---|---|---|---|---|---|
| | | | | | Measure | Criterion | | |
| | (b) (7)(E) | | | | | | | |
| A17 | | | | | | | | |

| ID# | Attribute | Source | Para | M# | Standard | | LUT Result | Type |
|---|---|---|---|---|---|---|---|---|
| | | | | | Measure | Criterion | | |
| | | (b) (7)(E) | | | | | | |
| A18 | Reliability | | | | | | | |
| A19 | Availability | | | | | | | |

| ID# | Attribute | Source | Para | M# | Standard | | LUT Result | Type |
|---|---|---|---|---|---|---|---|---|
| | | | | | Measure | Criterion | | |
| | | (b) (7)(E) | | | | | | |
| A20 | Maintainability | | | | | | | |

| ID# | Attribute | Source | Para | M# | Standard | | LUT Result | Type |
|---|---|---|---|---|---|---|---|---|
| | | | | | Measure | Criterion | | |
| | | (b) (7)(E) | | | | | | |

| ID# | Attribute | Source | Para | M# | Standard | | LUT Result | Type |
|---|---|---|---|---|---|---|---|---|
| | | | | | Measure | Criterion | | |
| | | (b) (7)(E) | | | | | | |
| A2 1 | Logistic Supportability | | | | | | | |

| ID# | Attribute | Source | Para | M# | Standard | | LUT Result | Type |
|---|---|---|---|---|---|---|---|---|
| | | | | | Measure | Criterion | | |
| | | (b)(7)(E) | | | | | | |

| ID# | Attribute | Source | Para | M# | Standard | | LUT Result | Type |
|---|---|---|---|---|---|---|---|---|
| | | | | | Measure | Criterion | | |
| | | (b) (7)(E) | | | | | | |
| A2 2 | Training | | | | | | | |

| ID# | Attribute | Source | Para | M# | Standard | | LUT Result | Type |
|---|---|---|---|---|---|---|---|---|
| | | | | | Measure | Criterion | | |
| | | (b) (7)(E) | | | | | | |

Notes:
Grey highlighting of a row indicates the Attribute/Measure was Not in Scope/Orphaned for the LUT, and was not tested.

# Appendix E USER SURVEY RESPONSES

## E.1 Introduction

The following describes the approach and methodology used for collecting user feedback in support of Limited User Test.

### E.1.1 Approach

A usability analysis approach was implemented in order to evaluate the "ease of use" elements of the IFT system as part of the LUT. The goal of this approach was to collect and analyze user feedback within the context of nine critical operational areas. In addition, agents completed a System Usability Scale (SUS) questionnaire that measured perceptions of usability.

Trained USBP agents participated in the fifteen-day LUT event. (b) (7)(E) agents operated the system per shift (b) (7)(E) per day. Throughout the LUT, agents provided feedback using surveys stored on touch-screen tablets using the PNNL CORE system. Both quantitative (rating scales) and qualitative (short fill-in) responses were collected. Means for each of the ratings were calculated, and responses to short fill-in questions were summarized, collated, and analyzed for patterns. In addition, agents provided feedback during end-of-day hot washes and individual end-of-test interviews.

### E.1.2 Methodology

**Participants**

Per Figure E- (b) (7)(E) CBP agents participated in the LUT survey. Although agent experience varie (b) (7)(E) Most of the agents possessed significant experience in related systems such as RVSS, MSS, and MSC. Agents had completed a combination of IFT Familiarization Training, Deployment Classroom Training, and Deployment Hands-on Training. (b) (7)(E) he number of subjects (b) (7)(E) as well as their background and experience provided a representative sample of users of sufficient sample size for the test event.

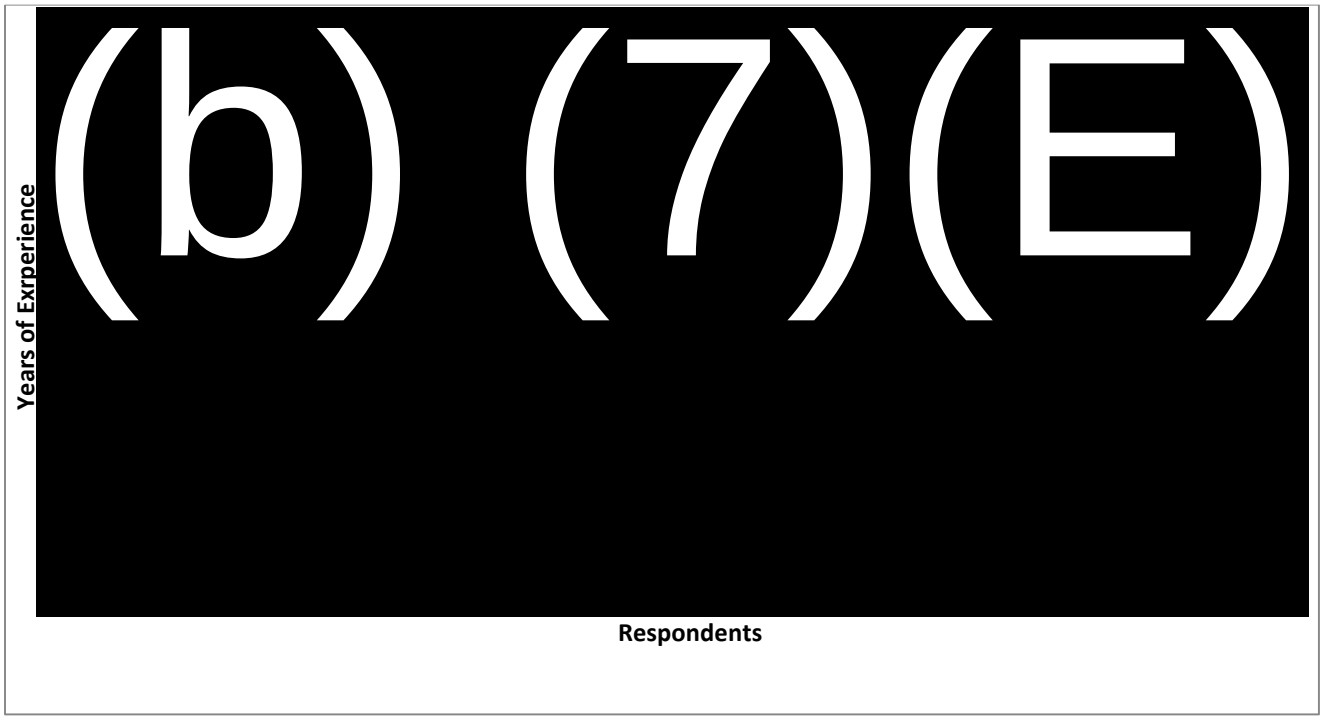



**Figure E-1: Agent Experience**

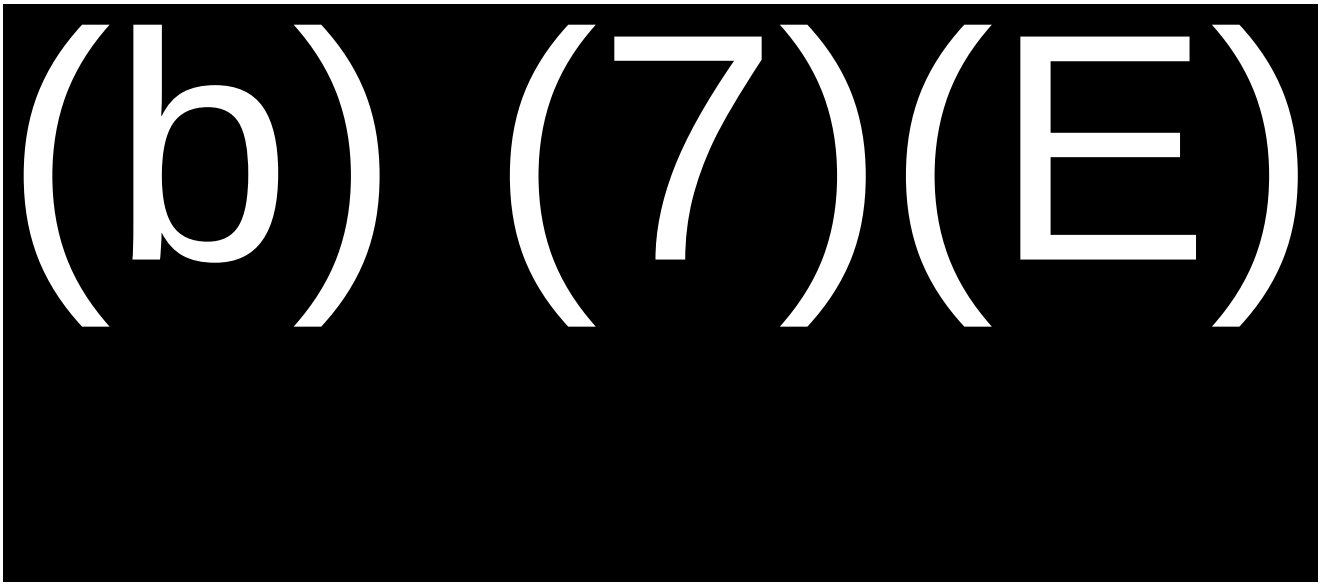
**Survey Development**

Based upon the objective established for the user feedback portion of the LUT, nine categories were chosen for inclusion in the user feedback survey/interviews. These categories are as follows:

- (b) (7)(E)

A total of eighty questions were developed for the one hundred and twenty-eight critical areas. Agents were also asked to prioritize a set of enhancements that were identified during the Operator Evaluation, an earlier test conducted as part of SAT. The survey utilized a combination of question types, to include rating scales, binary responses (i.e., yes/no) and open-ended follow-up questions. The 5-point Likert rating scale, one of the most common scaling methods for usability testing, was used to indicate "level of agreement" for usability statements as well as "frequency" in observing latency of the camera and image anomalies. In general, a rating

response of 1 or 2 indicated a negative response, and a rating response of 4 or 5 indicated a positive response. A rating of 3 was considered a limit or "red line" value, indicating an area that may require closer investigation. Below are examples of questions that were included in the survey.




Please comment on anything that (b) (7)(E) the above questions.

_____
_____
_____
_____

**Data Collection Procedure**

Over a fifteen-day period, each agent completed a survey. On Day 1, each agent received an introductory briefing that described the objectives of the LUT, shift schedule, survey, and instructions on completing the survey at the CORE site. Once agents had completed 3 shifts, they were encouraged to work on parts of the survey after each shift, ensuring that it was completed by the end of their participation in the evaluation. Given that this event represented some agents' first experience with IFT, we expected agents to be learning new skills as the event proceeded (i.e., learning curve). Therefore, we allowed agents to change their responses to survey questions at any time prior to the completion of the event, taking into account their improved skills and added experience. At the completion of the event, agents participated in individual wrap-up interviews with the human factors SME. Agents also completed an eleven question SUS questionnaire at the completion of the event.

## E.2 Results

The quantitative (mean ratings) and qualitative (short fill-in) responses are provided as part of this report. Ratings, ranging from 1 to 5, were averaged across the (b) (7)(E) agents for each survey question and are presented by critical area. User comments were combined and analyzed for patterns and grouped where appropriate. A list of top issues and recommendations are also provided, based upon survey comments and wrap-up interviews.

### E.2.1 (b) (7)(E)

Agents were asked to assess (b) (7)(E). Questions addressed (b) (7)(E)

(b) (7)(E)

**Figure E-2: Mean Scores for (b) (7)(E)**

As depicted in Figure E-2, mean scores ranged from (b) (7)(E)

### E.2.2 (b) (7)(E)

Agents were asked to assess (b) (7)(E). Questions addressed (b) (7)(E) gents were also asked to provide comments regarding (b) (7)(E) (b) (7)(E).

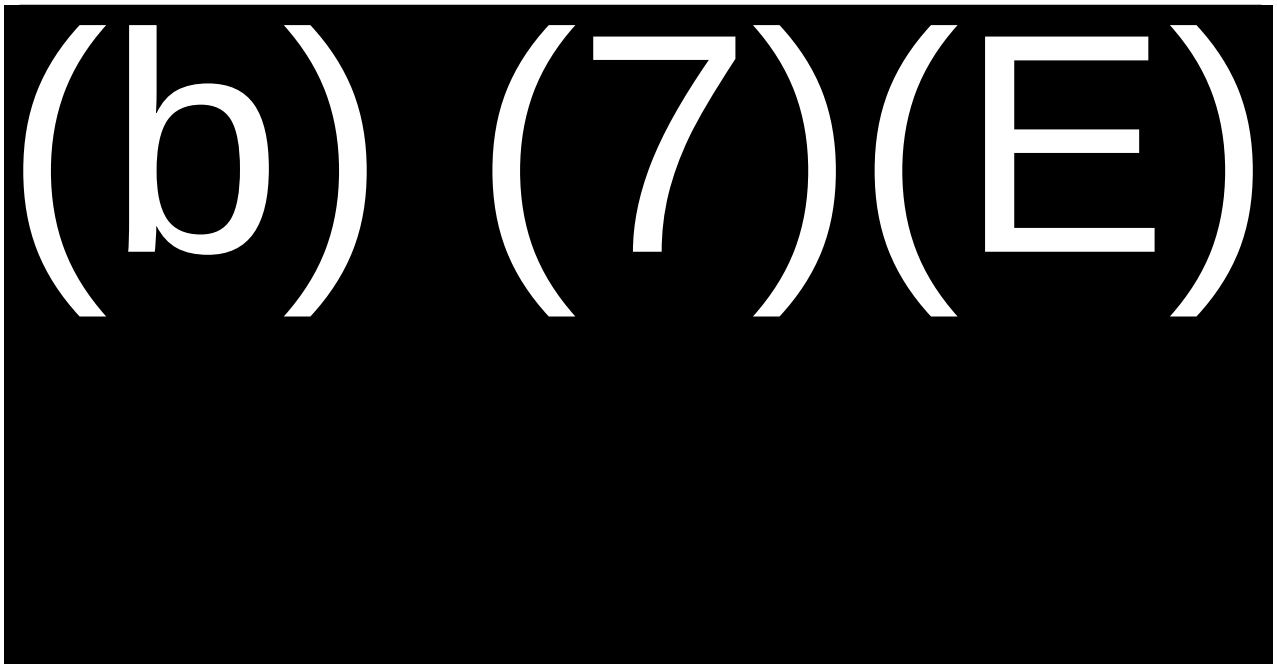



**Figure E-3: Mean Scores for (b) (7)(E)**

As depicted in Figure E-3, mean scores ranged from (b) (7)(E) In the wrap-up sessions, agents reported that (b) (7)(E).

### E.2.3 (b) (7)(E)

Agents were asked to evaluate (b) (7)(E). Questions addressed their overall satisfaction with the (b) (7)(E).

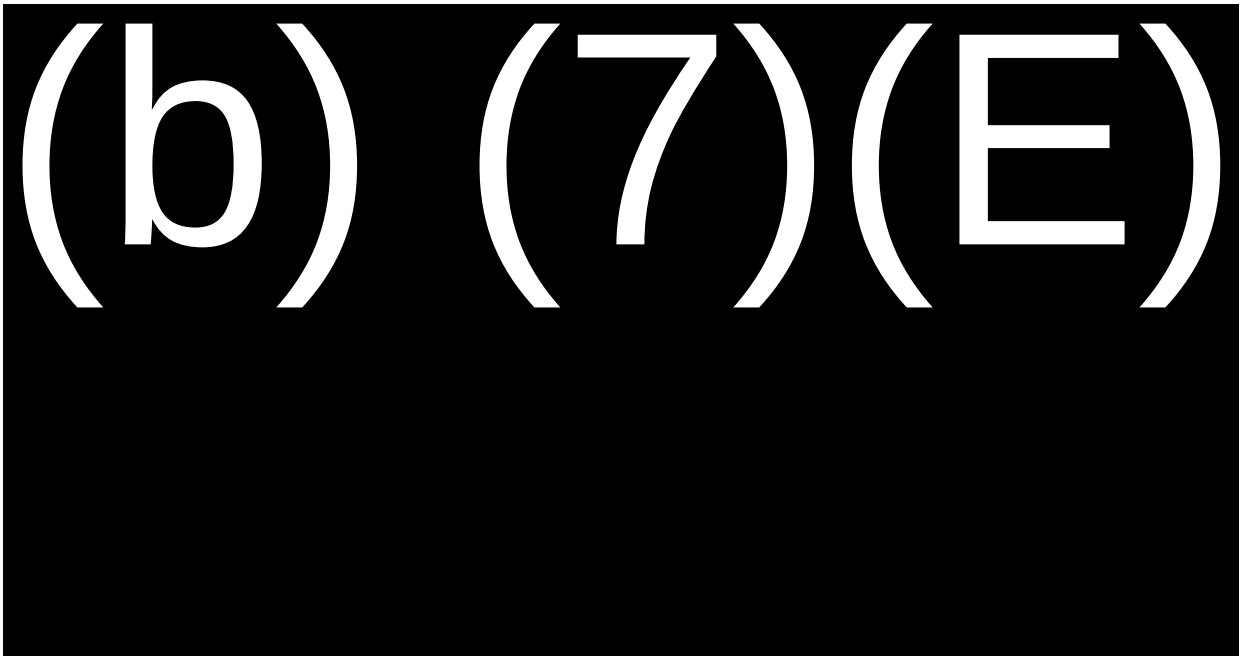



**Figure E-4: Mean Scores** (b) (7)(E)

As depicted in Figure E-4, mean scores ranged from (b) (7)(E)

Agents also reported (b) (7)(E)

(b) (7)(E)

.

**E.2.4** (b) (7)(E)

Agents were asked to assess th (b) (7)(E)

Questions also addressed (b) (7)(E) ,

(b) (7)(E)

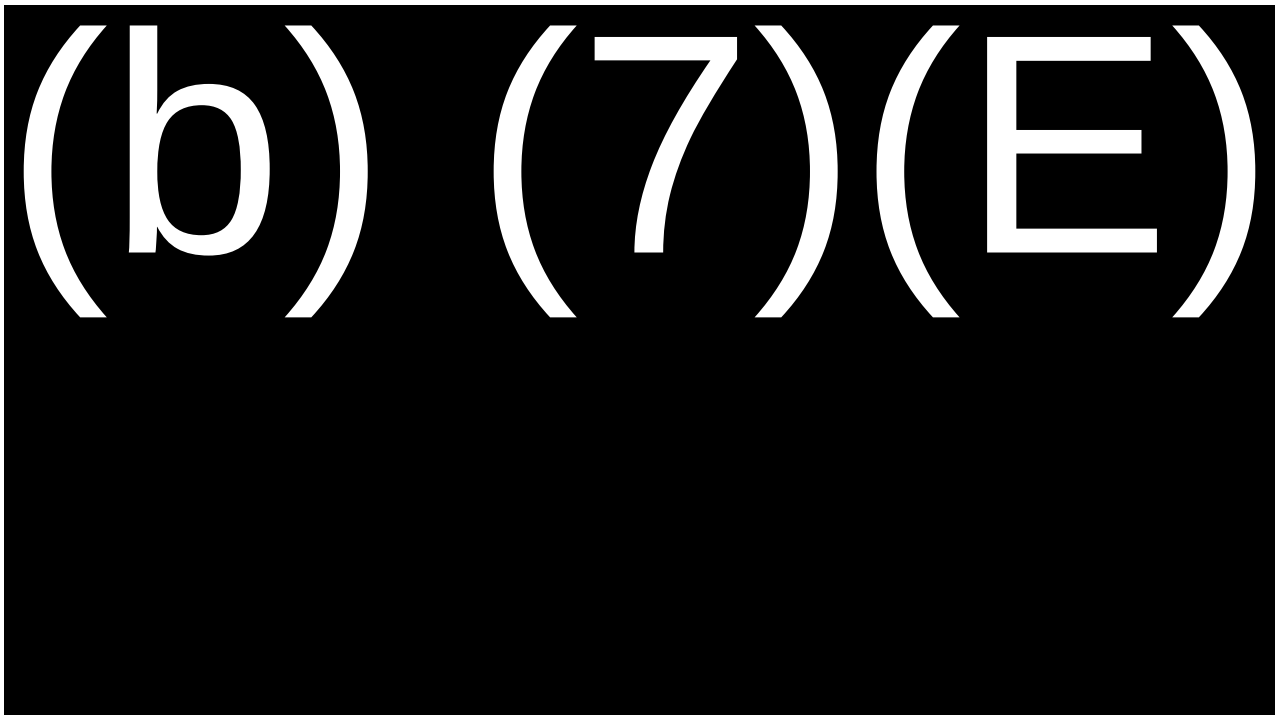



**Figure E-5: Mean Scores for** (b) (7)(E)

As depicted in Figure E-5, mean scores ranged fro (b) (7)(E)

Agents reported (b) (7)(E)

**E.2.5** (b) (7)(E)

Agents were asked to assess (b) (7)(E)

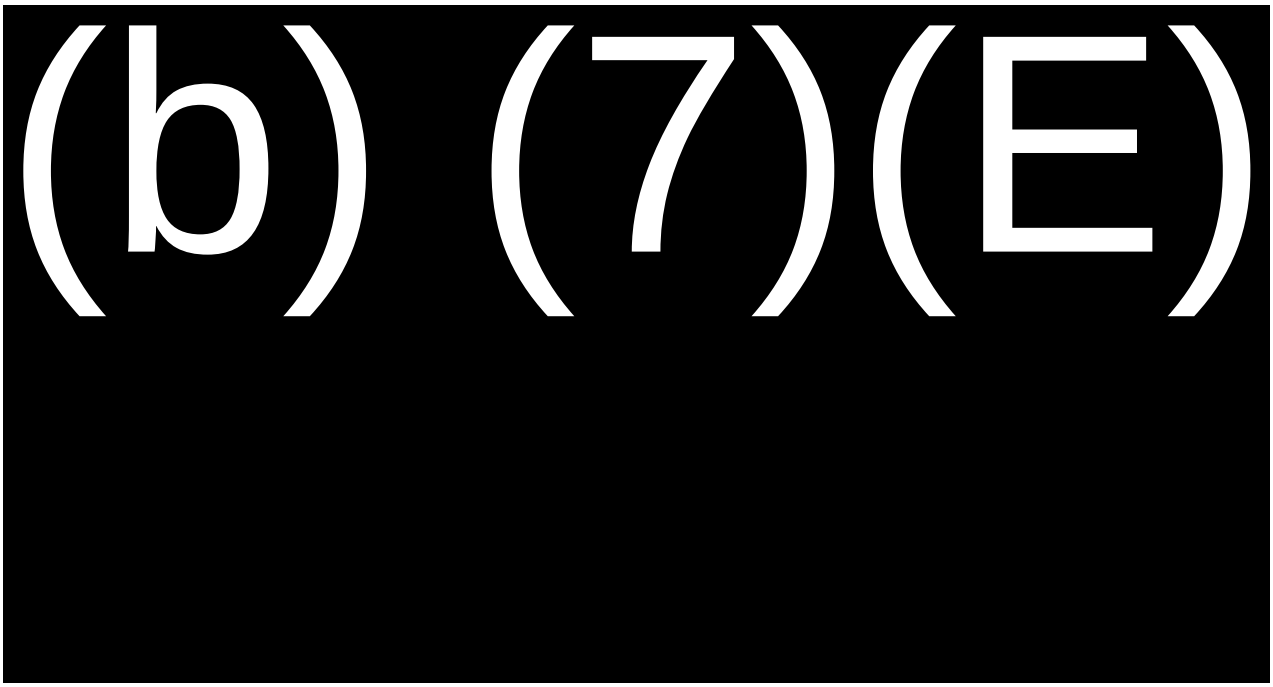



**Figure E-6: Mean Scores for** (b) (7)(E)

As depicted in Figure E-6, mean scores ranged from (b) (7)(E)

**E.2.6** (b) (7)(E)

Agents were asked to assess (b) (7)(E) Questions addressed (b) (7)(E)

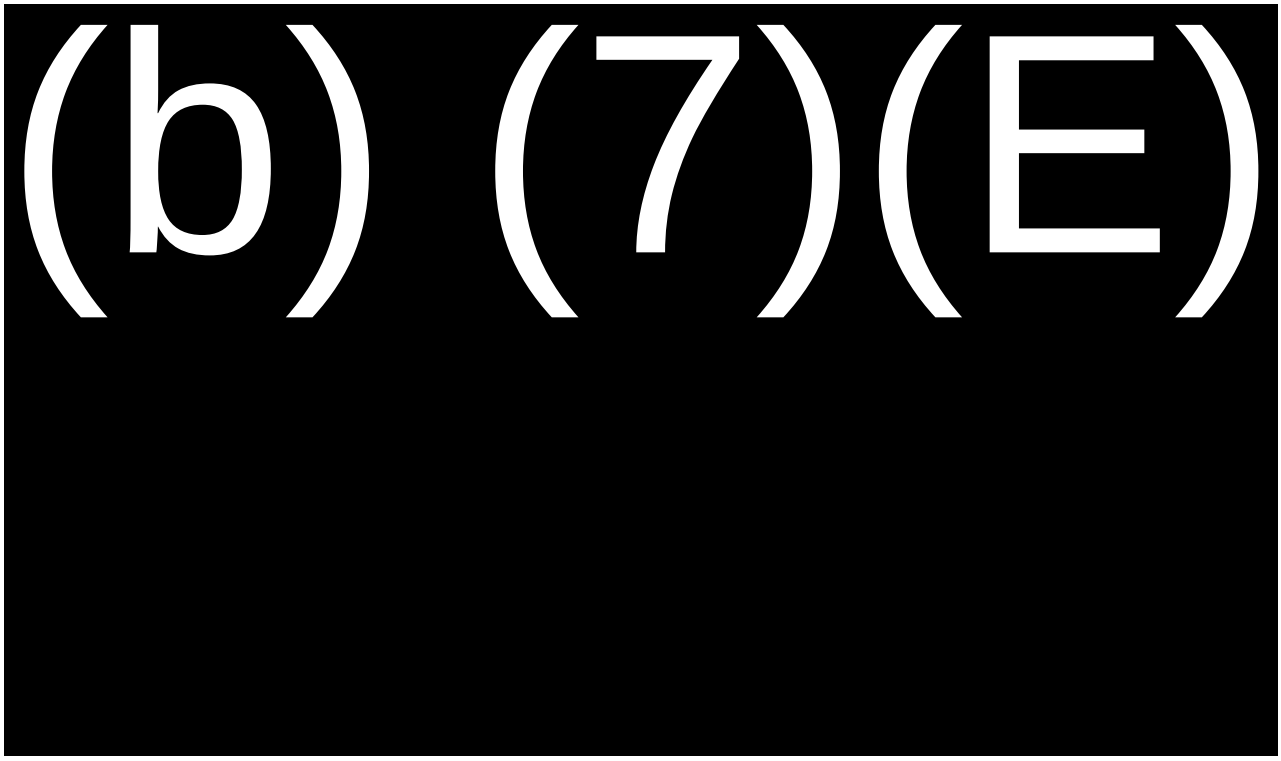



**Figure E-7: Mean Scores for (b) (7)(E)**

As depicted in Figure E-7, mean scores ranged fro (b) (7)(E) Agents would l (b) (7)(E) (b) (7)(E).

**E.2.7** (b) (7)(E)

Agents were asked to evaluat (b) (7)(E). Results are depicted in three graphs below (i.e., positive, borderline, and negative ratings)

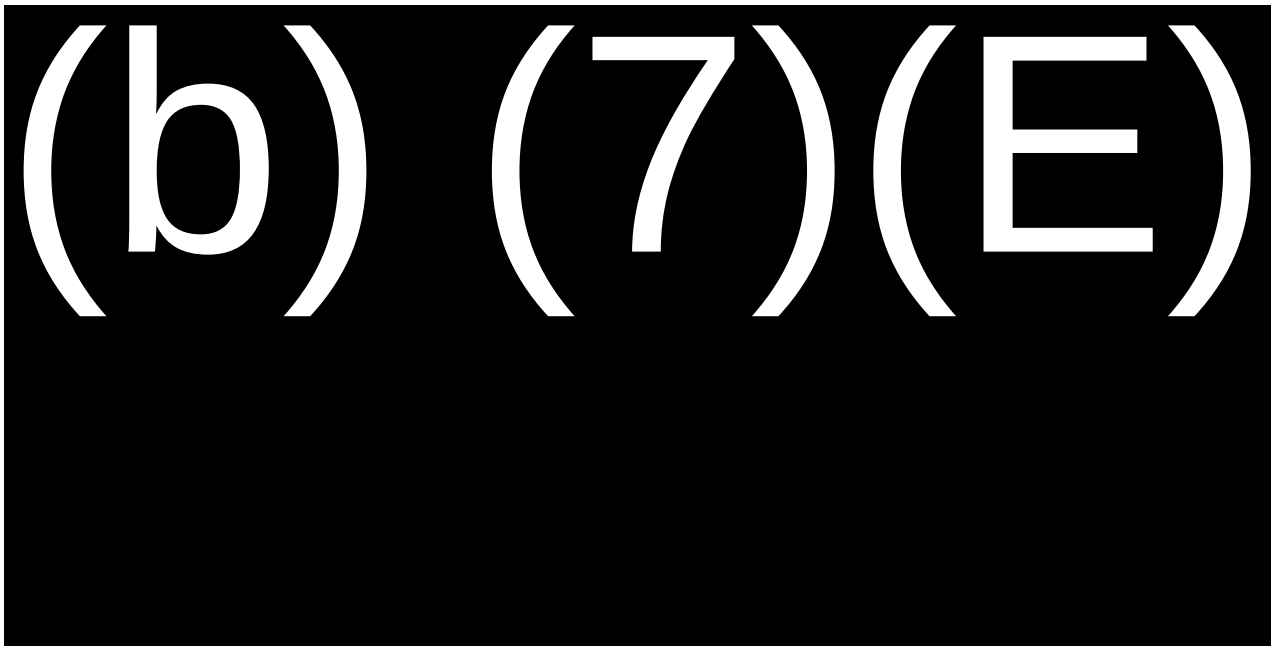



**Figure E-8: Mean Scores for** (b) (7)(E)

As depicted in Figure E-8, mean scores ranged from (b) (7)(E)

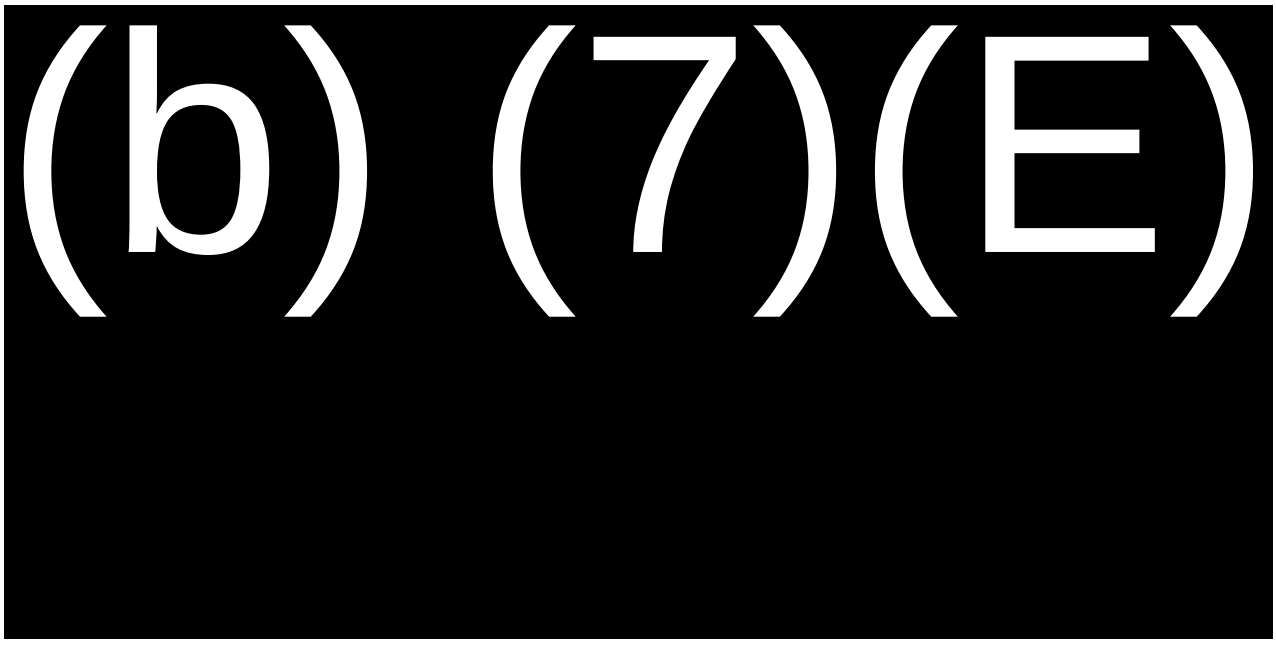



**Figure E-9: Mean Scores for** (b) (7)(E)

As depicted in E-9, mean scores ranged from (b) (7)(E)

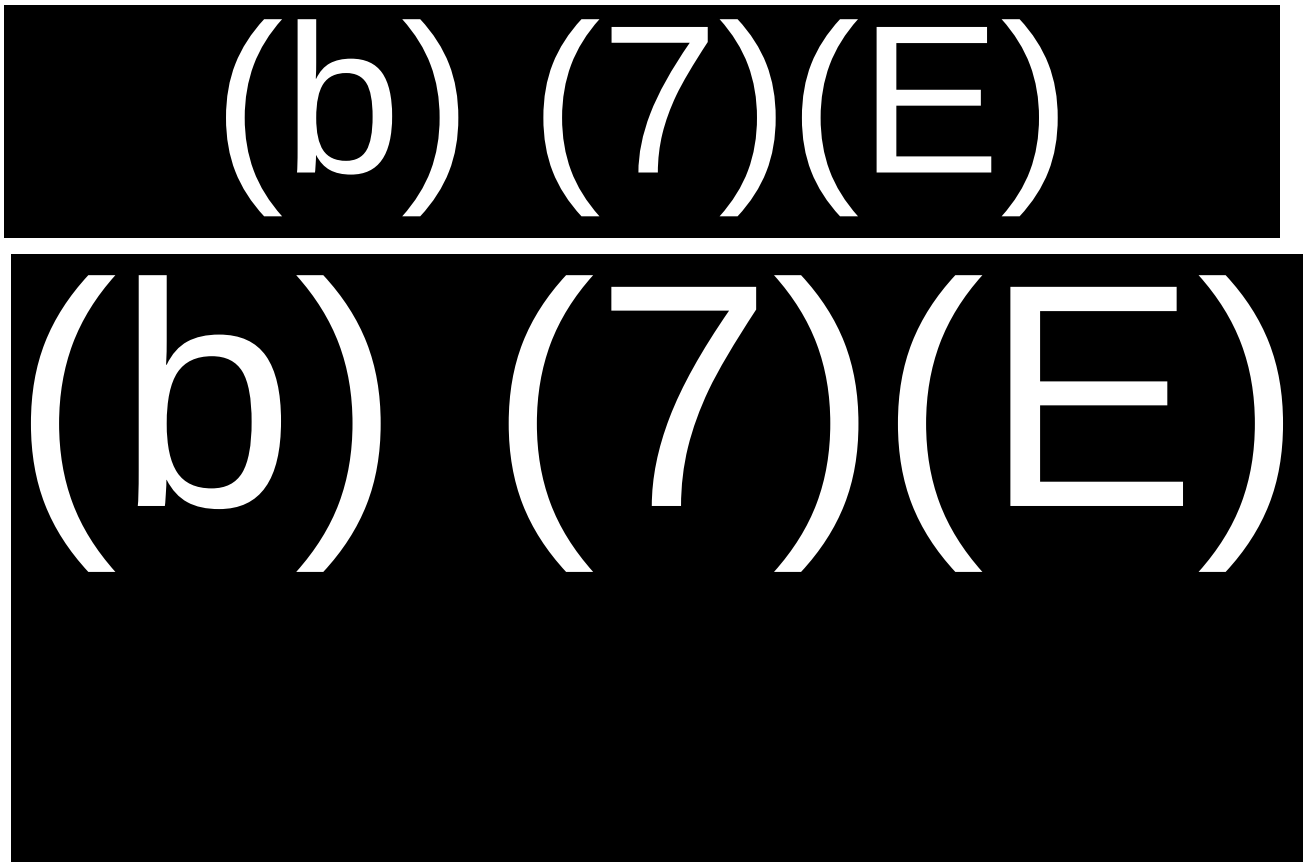



**Figure E-10: Mean Scores for Workstation Tools – (b) (7)(E)**

As depicted in Figure E-10, mean scores ranged from (b) (7)(E)

Agents reported that (b) (7)(E)
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## E.3 Key Issues and Recommended Enhancements

Two types of qualitative responses were collected. First, responses to survey short fill-in questions were summarized, collated, and analyzed for patterns. Second, agents provided feedback during end-of-test interviews with the human factors SME. The following describes key likes/dislikes, issues, and recommendations for improvements.

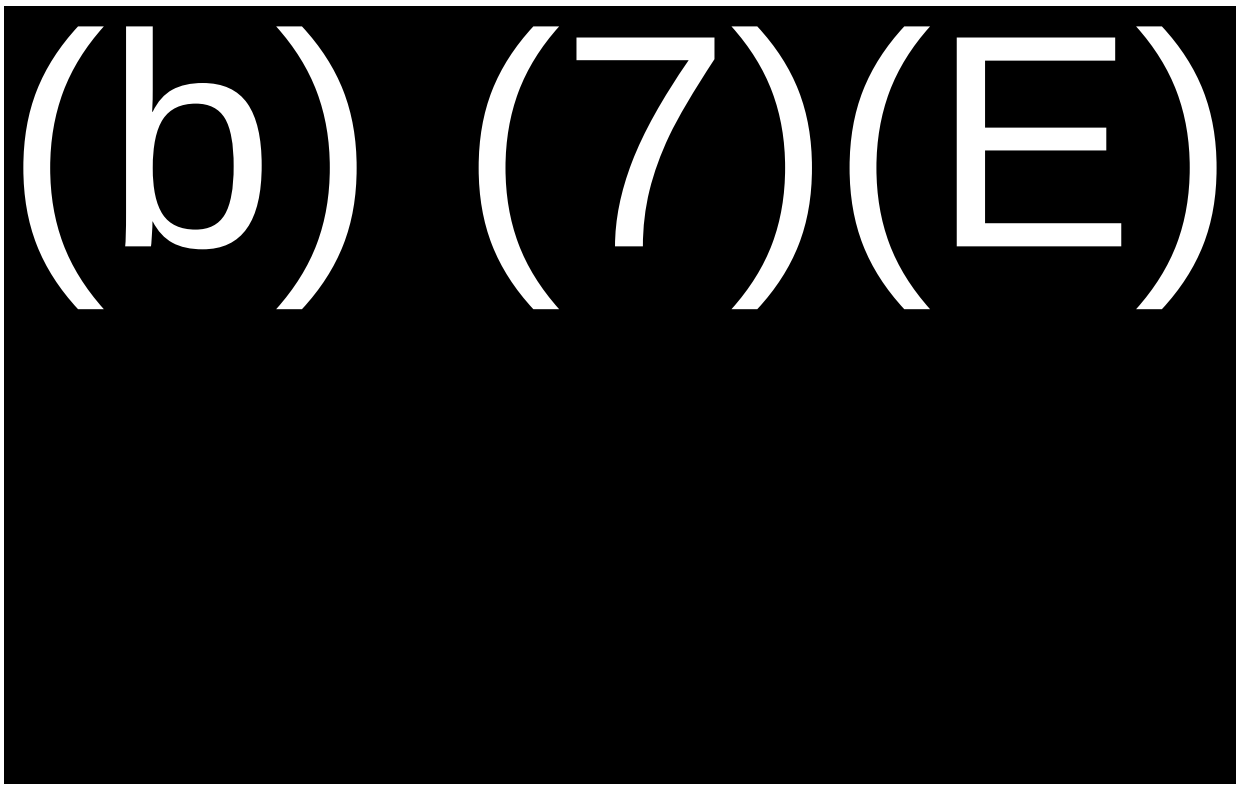
### E.3.1 Positive Feedback from Agents

Overall, agents reported (b) (7)(E)

(b) (7)(E)

### E.3.2 Prioritization of HMI Improvements

As part of the survey, agents were asked to rate the importance of a set of HMI improvements that were identified during the Operator Evaluation. Agents rated each improvement using a 1-3 ratings scale, with 1 = not very important, 2 = moderately important, and 3 = extremely important. (b) (7)(E)




### E.3.3 System Usability Scale (SUS)

Agents completed a System Usability Scale (SUS) questionnaire that measured perceptions of usability. The SUS is a well-established, technology independent tool used to test "ease of use" on a variety of interfaces. Further, SUS has been shown to be a robust tool that is reliable (i.e., repeatability of the responses) and valid. SUS is a 10 item questionnaire with five response options (i.e. 1 = strongly disagree through 4 = strongly agree). An eleventh question was added to test for absolute usability using a seven-point scale (i.e., 1 = worst imaginable through 7 = best

imaginable). For the eleventh question respondents answered the following, “Overall, I would rate the user-friendliness of this product as _____”.

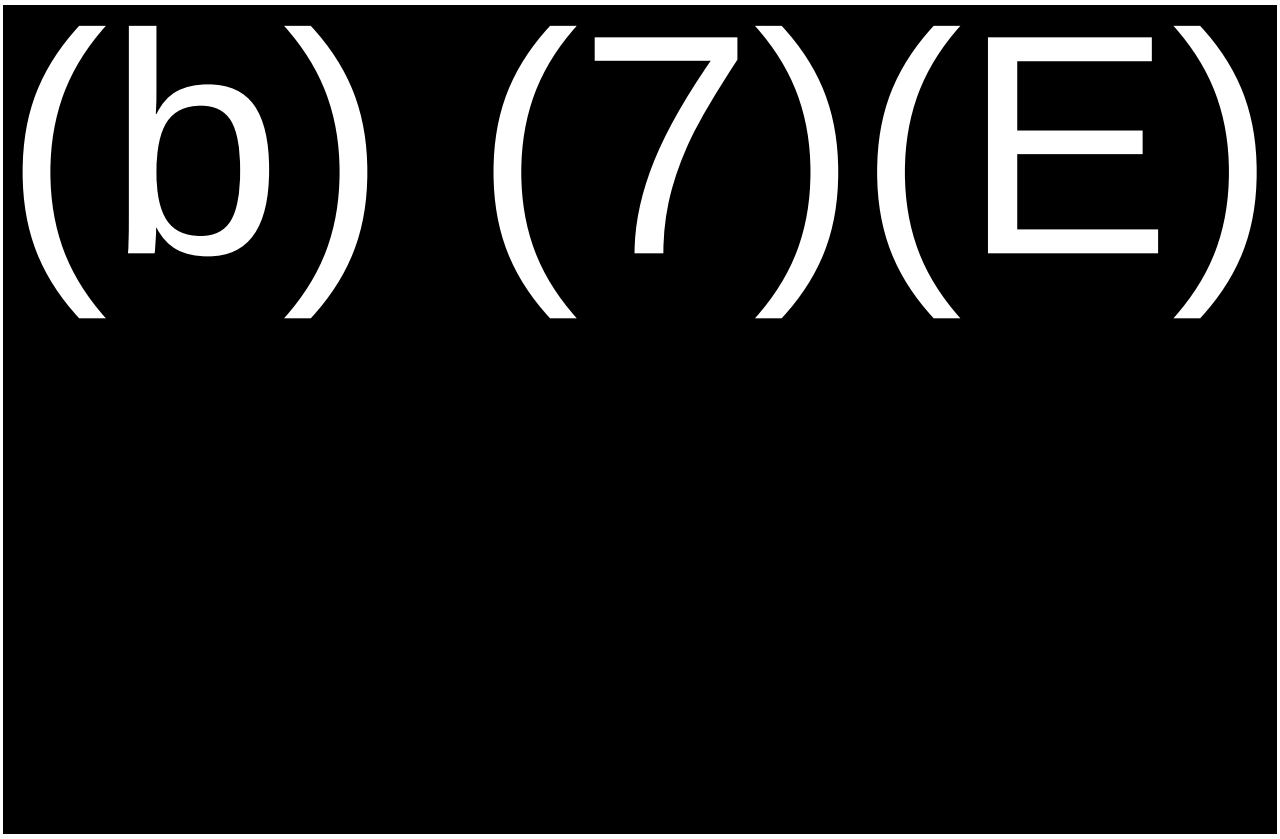



**Figure E-11: System Usability Scale Results for IFT**

As depicted in Figure E-11, the mean score for IFT on the SUS was (b) (7)(E) It is expected that by implementing the improvements identified in Section E.3.2, future SUS scores would improve.

## Appendix F RESOURCES

| RESOURCE | PROVIDED |
|---|---|
| **Test Articles** | |
| (b) (7)(E) IFT | October 26 – November 14, 2015 |
| **Test Sites** | |
| (b) (7)(E) Border Patrol Station | 15 days |

(b) (7)(E)

**Test Targets and Expendables**

(b) (7)(E)

**CBP Personnel Test Support**

(b) (7)(E)

**Simulations, Models, and Test Beds**

None

**Special Requirements**

(b) (7)(E)

**Manpower/Personnel Training**

(b) (7)(E)

## Appendix G DISTRIBUTION OF REPORT

Copy to:

IFT Program Manager
OTIA
OBP
USBP
ORMD
(b) (7)(E) Station

## Appendix H ACRONYMS

| Acronym | Definition |
|---|---|
| $A_o$ | Operational Availability |
| AoC | Area of Coverage |
| AoI | Area of Interest |
| AoR | Area of Responsibility |
| ATO | Authority to Operate |
| (b) (7)(E) | |
| BPA | Border Patrol Agent |
| BPS | Border Patrol Station |
| C2 | Command and Control |
| C2CEN | Command and Control Center |
| C2F | Command and Control Facility |
| C4I | Command, Control, Communication, Coordination and Intelligence |
| CBP | Customs and Border Protection |
| CMLS | Contract Maintenance Logistic Support |
| COIs | Critical Operational Issues |
| CONOPS | Concept of Operations |
| COP | Common Operating Picture |
| CORE | Common Operating and Response Environment |
| COTF | Commander, Operational Test and Evaluation Force |
| DCS | Data Collection System |
| DID | Data Item Description |
| DMS | Data Management System |
| DOE | Design of Experiment |
| DT&E | Development Test and Evaluation |
| (b) (7)(E) | |
| FIPO | For USBP Information Purposes Only |
| FMV | Full Motion Video |
| FOR | Field of Regard |
| FOV | Field of View |
| FSD | Functional Specification Document |
| FSTU | Fixed Surveillance Tower Units |
| GDOS | General Dynamics One Source |
| GFE | Government Furnished Equipment |
| GUI | Graphic User Interface |
| IAA | Inter-Agency Agreement |
| ICSP | Integrated Contractor Support Plan |
| ID | Identification |
| IEF | Integrated Evaluation Framework |
| IFOV | Instantaneous Field of View |
| IFT | Integrated Fixed Tower |

| Acronym | Definition |
|---|---|
| IoI | Item of Interest |
| (b) (7)(E) | |
| ISSM | Information Security System Manager |
| IT | Information Technology |
| ITO | Independent Test Organization |
| KPP | Key Performance Parameter |
| (b) (7)(E) | |
| LOO | Letters of Observation |
| LR | Long Range |
| LRU | Line Replaceable Unit |
| LSE | Lead System Engineer |
| LUT | Limited User Test |
| MBTD | Mission-based Test Design |
| MCT | Mission Capable Time |
| MDT | Mean Down Time |
| MLDT | Mean Logistics Delay Time |
| MNS | Mission Needs Statement |
| MPH | Miles Per Hour |
| MR | Medium Range |
| MSC | Mobile Surveillance Capability |
| MSS | Mobile Surveillance System |
| MTBCF | Mean Time Between Critical Failures |
| MTBF | Mean Time Between Failure |
| MTTR | Mean Time to Repair |
| (b) (7)(E) | |
| NVG | Night Vision Goggles |
| O | Objective |
| OBP | Office of Border Patrol |
| OCI | Operational Capabilities of Interest |
| OE | Operational Effectiveness |
| OEB | Operational Evaluation Branch |
| OTF | On-the-Job |
| OPCONs | Operational Considerations |
| ORD | Operational Requirements Document |
| OTIAOS | Operational Suitability |
| OSD | On-screen-display |
| OSHA | Occupational Safety and Health Administration |
| OT | Operational Test |
| OTA | Operational Test Authority |
| OT&E | Operational Test and Evaluation |
| OTIA | Office of Technology Innovation and Acquisition |

| Acronym | Definition |
|---|---|
| PD | Probability of Detection |
| PID | Probability of Identification |
| PM | Preventive Maintenance |
| PMO | Program Management Office |
| PNNL | Pacific Northwest National Laboratory |
| [redacted] | [redacted] |
| [redacted] | [redacted] |
| PWS | Performance Work Statement |
| QLB | Quick Look Brief |
| QLR | Quick Look Report |
| RAM | Reliability, Availability and Maintainability |
| RAML | Reliability, Availability, Maintainability, And Logistics |
| RFR | Runs for Record |
| SAED | System Analysis and Evaluation Division |
| SAM | System Availability Metric |
| SAR | Shift Activity Report |
| SAT | System Acceptance Test / Satisfactory |
| SBI | Secure Border Initiative |
| SCD | Secondary Collective Display |
| SDR | System Definition Review |
| SE | Systems Engineering |
| SED | Systems Engineering Directorate |
| SIMEX | Simulation Experiment |
| SME | Subject Matter Expert |
| SOC | Security Operations Center |
| SOPs | Standard Operating Procedures |
| SoS | System of Systems |
| SR | Short Range |
| SUS | System Usability Scale |
| SUT | System Under Test |
| T | Threshold |
| TD | Test Director |
| TEGR | Test Event Gate Review |
| TEMP | Test and Evaluation Master Plan |
| TI | Time to Identify |
| TIR | Test Incident Report |
| TL | Test Lead |
| TO | Test Objectives |
| TOR | Test Observation Report |
| ToO | Target of Opportunity |
| TRB | Test Review Board |
| TRR | Test Readiness Review |

| Acronym | Definition |
|---|---|
| TSR | Technical Service Requests |
| TT | Test Team |
| TTPs | Tactics, Techniques, And Procedures |
| [redacted] | (b) (7)(E) |
| UNSAT | Unsatisfactory |
| USBP | United States Borer Patrol |
| VMS | Video Management System |

## Appendix I REFERENCES

| Reference No. | Document No. | Document Description | Date |
|---|---|---|---|
| 1. | OTIA05-IFT-00-000001 | IFT ORD | September 27, 2011 |
| 2. | OTIA02-IFT-07-000050-Version A | IFT TEMP | November 20, 2013 |
| 3. | *OTIA05-IFT-71-150016* | IFT LUT Plan | June 23, 2015 |
| 5. | DHS CBP-002 | U.S. Customs and Border Protection Security Classification Guide | July, 2013 |
| 6. | DOT&E Memorandum | DOT&E IFT LUT Test Plan | October 8, 2015 |
| 7. | OTIA05-RVSS-00140024 | IFT Integrated Evaluation Framework | Beta |
| 8. | 150099Task5.2.01F | IFT Simulation Experiment | May 11, 2015 |
| 9. | DHS HQ | Security Assessment Report | Draft Report |
| 10. | OTIA06-IFT-14-000005 Rev A | IFT System Acceptance Test Observation Final Report | August 18, 2015 |
| 11. | OTIA Decision Memorandum | IFT System Definition Review Memorandum | April 25, 2014 |